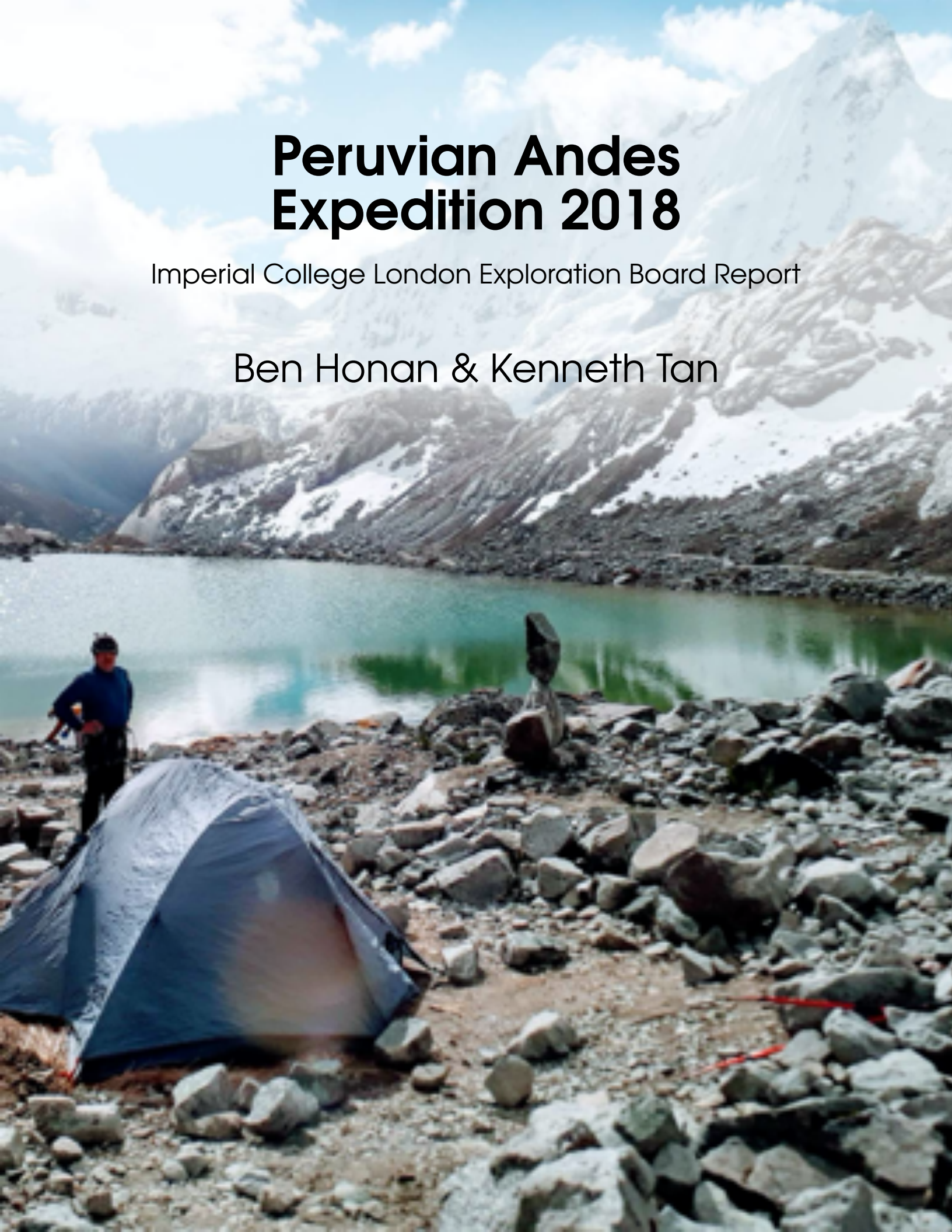
Peruvian Andes Expedition 2018

Imperial College London Exploration Board Report

Ben Honan & Kenneth Tan



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1. Expedition Plans

1.1 Aims and Objectives

From the 15th July to the 5th of September 2018, we aimed to complete a number of long distance backpacking trips in the Peruvian Andes around the Cordillera Blanca and Huayhuash, traveling at high altitudes across pre-Incan trails that have been established for centuries. Our three main hiking objectives were the 7-14 day Santa-Cruz-Alpamayo trek, the 7-14 day Huayhuash circuit and the 4 day Quebrada Carhuascancha trek in the relatively remote Conchucos district near the ancient ruins of Chavín de Huantar. By completing these hikes, we would be pushing our mental and physical limits, learning to get by in foreign third-world country with a very limited knowledge of the local language and familiarising ourselves with the physiological and psychological challenges associated with prolonged exposure to extreme high altitudes (such as camping at the base of a glacier above 5500m).

1.2 Background

1.2.1 Motivations

We were originally inspired by descriptions of the natural beauty of the Peruvian Andes in Joe Simpon's epic account of a mountaineering disaster, touching the void. After recounting his brush with death, Simpson writes "*I realized with a start that despite twenty years of climbing mountains all over the world, the Cordillera Huayhuash was still the most beautiful mountain range I have ever laid my eyes upon.*". What really distinguishes the Cordillera Blanca and Huayhuash from other areas is the accessibility of high altitude trails and peaks. We wanted to experience the struggles and rewards associated with high altitude trekking first hand.

1.2.2 Location

The Cordillera Blanca is situated in the Ancash region, sandwiched between the populated Rio Santa valley (which contains Huaraz) and the "Callejon de Conchucos" series of river valleys to the east of the mountains. The Cordillera Blanca is protected by the National Park of Huascaran. The Cordillera

Blanca is the highest tropical mountain range in the world. It contains Peru's largest peak (Huascarán - 6768m), marks the continental divide and has five of the most spectacular peaks above 6000m in the Peruvian Andes. Moreover, one of the Cordillera Blanca peaks; Alpamayo (5,947m), has been voted by a survey amongst mountaineering experts as "the most beautiful mountain in the world".

Just to the southeast of the Cordillera Blanca is the Cordillera Huayhuash. It contains Peru's second highest mountain, Yerupajá (6617m). Yerupajá's smaller neighbour Siula Grande (6344m) was the arena of Joe Simpson's famous Touching the Void epic.

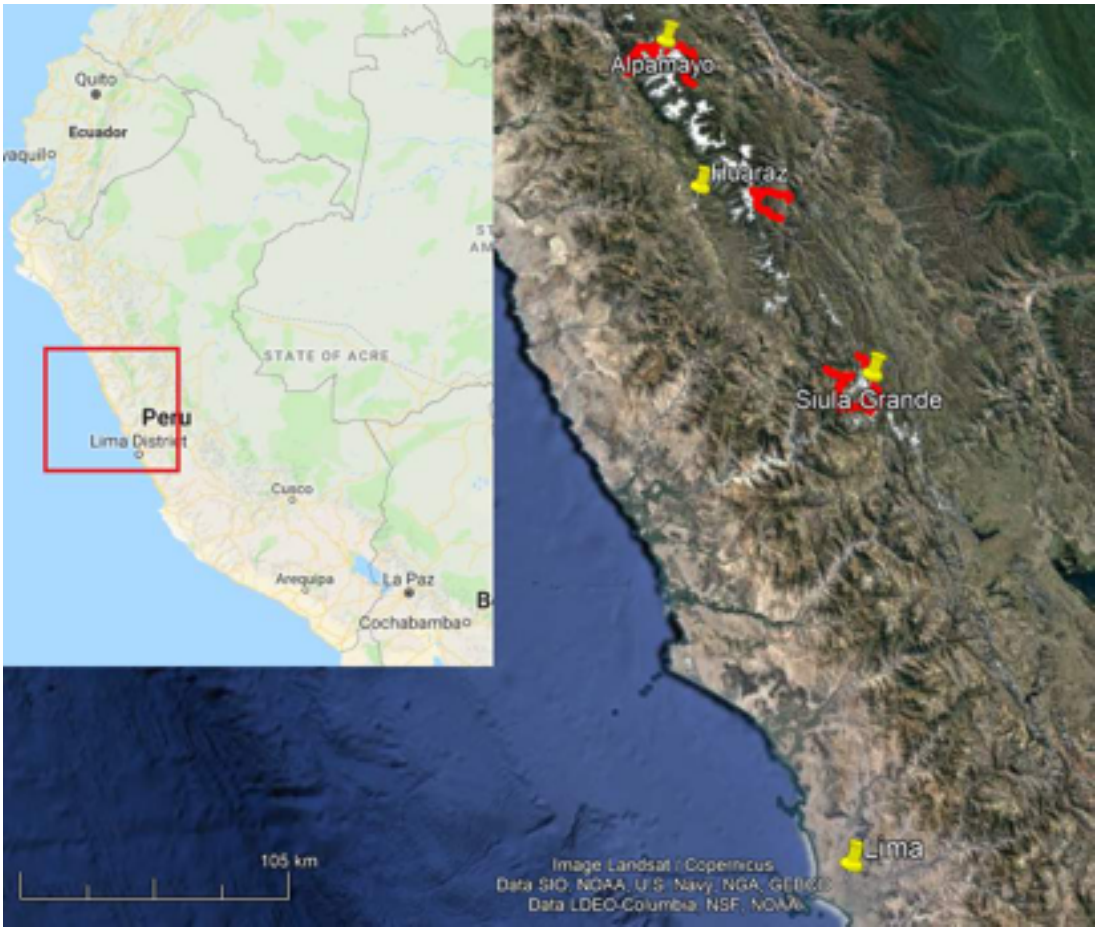


Figure 1.1: Overview map of a section of Peru from Google Earth. Lima (Peru's Capital), Huaraz (major city at 3km altitude), Siula Grande and Alpamayo are shown as yellow markers. Red lines correspond to intended hiking routes.

1.2.3 Cultural Background

The area around the Rio Santa valley was first colonised about 10,000 years ago. Proof of an advanced hunter-gatherer civilisation has been found in caves in the Yungay province (north of Huaraz). Some of the trails we walked were laid down by ancient civilizations millennia ago.

The Quebrada Carhuascancha trail starts at the archaeological site of Chavín de Huantar. Chavín used to be the pilgrimage site of the ancient (1000BC) Chavin cult. The Chavín culture lasted for about 800 years until for some unknown reason, the Andean people turned their backs on the cult. Around 400 years later, the "Recuay" culture began to prosper at the foot of the Cordillera Blanca where large temples, stone defences and irrigation systems were built. The most impressive Recuay ruins are the fortified citadel of Yayno. Yayno can be accessed after two days of hiking along the Santa Cruz - Alpamayo circuit (we intend not to visit this site as it requires a significant detour costing one or two days).

The areas around present-day Huaraz were assimilated into the Incan Empire at around the mid-15th century. The Cordilleras were later colonised by the Spanish in 1533.

Treks within the National park of Huascaran are in wilderness areas with scattered but friendly local populations. It is not unusual to stumble across a village fiesta with live music, traditional clothing, dancing and drinking.

2. Expedition Team

Kenneth Tan - Treasurer

22 years old, 3rd year Materials Science and Engineering

2015-Present: *Part of Imperial College Caving Club and is a leader with the experience and knowledge required to safely guide a group of novices into a cave.*

2015-2016: *Have been on several weekend trips hosted by the Imperial College Canoing Club.*

2015: *Week long ICCC winter tour in Yorkshire.*

2016: *Week long Easter Tour with the ICCC to Andalucia, Spain.*

2016: *Month long ICCC Slovenia expedition. Daily bounce trips to -600m. Frequent 1km vertical ascent restocking trips from basecamp to bivouac.*

2016: *Week long canyoning trip with 3 others in Domodossola, Italy.*

2017: *Week long Easter Tour with the ICCC to Hungary.*

2017: *Month long summer expedition tour with the ICCC to Tolminski Migovec, Solvenia.*

Ben Honan - Expedition Leader

22 years old, 4th year MSci Physics with Theoretical Physics

2014-Present: *Active member of Imperial College Caving Club (ICCC), president 2016-17.*

2014: *Two person Summer hiking for one week in Thórsmörk, Iceland including hiking part of the Landmannalaugar trail.*

2014: *ICCC Slovenia expedition, multiple bounce trips to -300m to -500m and 2 underground camping trips at -600m venturing as far as around -850m underground. Regular (every 1-2 days) 1km vertical ascent restocking trips from basecamp to bivouac. Three weeks.*

2015: *Two person Summer hiking of the Kungsleden trail in Sweden including summiting Sweden's high mountain, mount Kebnekaise (2106m). One week.*

2015: *Outdoor First aid course (Marlin).*

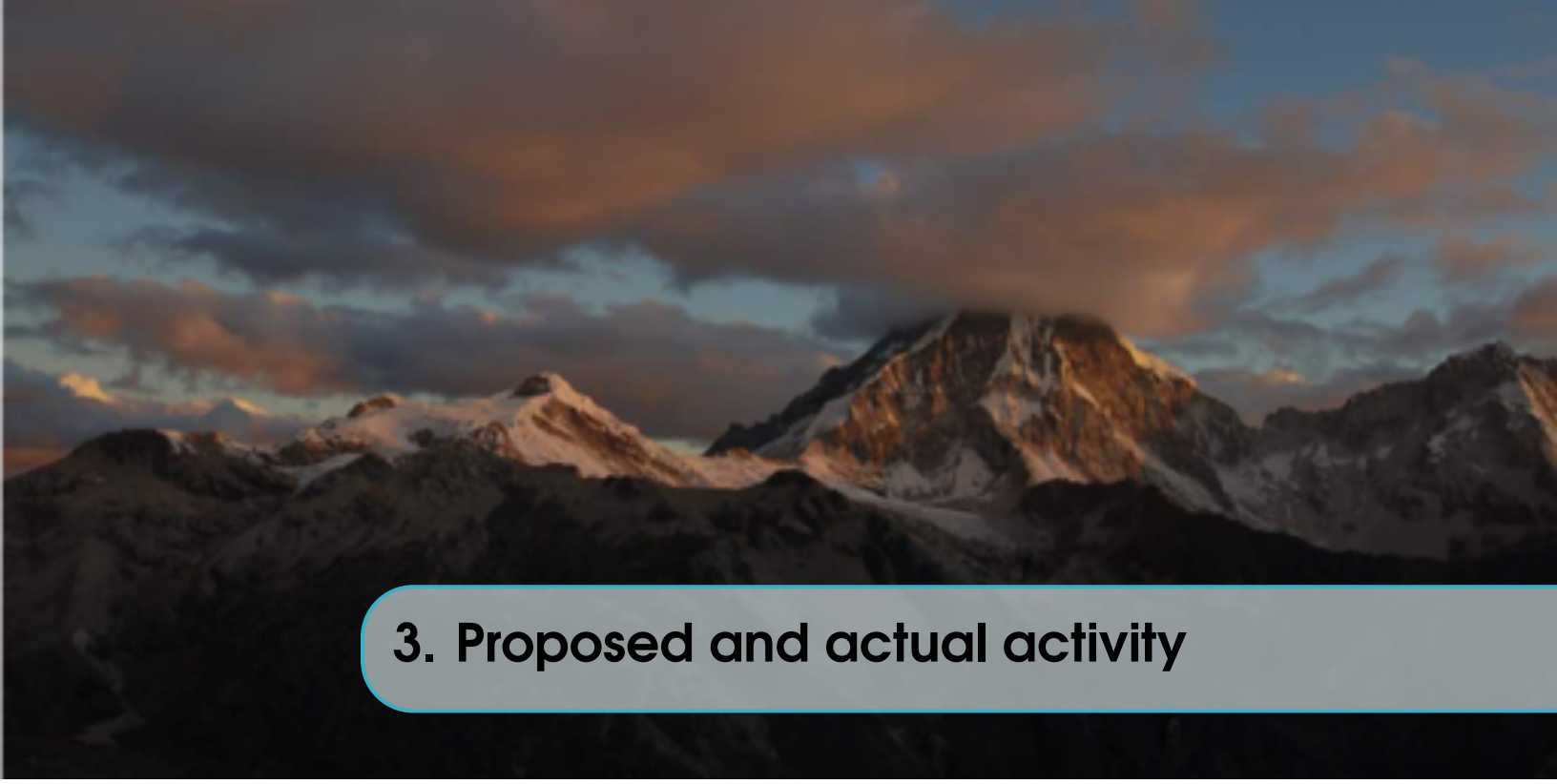
2016: *Solo unsupported mountain biking expedition (1000km+) during Autumn of the Montana to Wyoming part of the Great Divide Mountain Biking Route (GDMBR) which criss-crosses the US continental divide and has multiple high passes. High point: Togwotee Pass (2944m). Sustained cycling at 2500m+ without issues.*

2015,16: *ICCC Winter Tour. One week.*

2017: *ICCC Slovenia expedition, similar to 2014. Two weeks.*

2018: *Outdoor First aid course (React First).*

2018: *National Navigation Award Scheme (NNAS) silver navigation award.*



3. Proposed and actual activity

3.1 Itinerary

Day(s)	Proposed activity
1-2	Fly to Lima, Bus to Huaraz.
3	Acclimatisation day in Huaraz + Getting food/fuel and national park access
4	Acclimitisation day: Day hike to Laguna Wilcacocha
5	Acclimitisation day: Day hike to Laguna Churup
6	Travel to trail head of the Santa-Cruz-Alpamayo circuit
7-18	Trek along the Santa-Cruz-Alpamayo Circuit
18	Get back to Huaraz.
19	Rest day in Huaraz and organise fuel/food for Huayhuash circuit
20	Travel to trail head of Huayhuash Circuit.
21-31	7-14 day trek along the Huayhuash Circuit.
31	Overnight camp in Llamac at the end of the trail.
32	Bus back to Huaraz, rest in Huaraz.
33	Travel to trail head of Quebrada Carhuascancha.
34-38	Hike the Quebrada Carhuascancha.
38	Travel back to Huaraz.
39	Bus from Huaraz to Lima.
40-41	Flight from Lima to London.

3.2 Discrepancies between itinerary and actual activity

One of the first changes we made to our itinerary was adding a lot more rest and contingency days. Rest days ought to be a fundamental aspect to any acclimatization plan. Instead of the 41 day itinerary outlined we decided to go with 53 days. In hindsight, this was way more time than we needed but one of the main reasons we chose to add on that many days was because the flights would be relatively cheap if we left on the 5th of July.

Largely due to the extra time we had, our actual activities ended up being quite different to what was proposed.

After completing the Alpamayo circuit trek in 9 days we realised we would have significantly more time than we anticipated. With this extra time, we decided to rent some climbing gear and go lead climbing and bouldering around the area after purchasing a guide book. We are both relatively experienced climbers and Ben had been to Setesdal in Norway for a multi-pitch climbing trip prior to setting out to Peru.

After a rest day where we visited the ancient pre-incan ruins of Chavín de Huantar, we decided we were not particularly interested in this area, there were many more beautiful areas to discover in the more northern areas of the Cordillera Blanca. Hence we decided to call off our planned 5 day hike of the Quebrada Carhuascancha. With this extra time, we decided to take a 4-day beginners ice climbing course with a professional guide "César" from the "Casa de Guias"[1] in Huaraz. We chose our guide carefully as there are clearly significant risks involved with ice climbing and mountaineering. At the end up this course we managed to summit a 5500m mountain, mount “Yanapaccha”. After the ice climbing course, we realised we would still have time to complete the Huayhuash circuit and do some more mountaineering. We did not manage to complete the Huayhaush circuit however because Ben contracted a suspected gastrointestinal infection.

[1] The house of the guides is an exceptionally well regarded establishment whose guides regularly conduct mountain rescues in the Cordillera Blanca and Huayhuash.

4. Planning, Preparation and Training

4.1 Navigation

We spent the majority of the time using a GPS for navigation. Places of interest such as camping grounds, bus stops and airports were marked as waypoints. Ben had taken a navigation course prior to the expedition to ensure we would be confident in relying on paper maps in the event of a GPS failure. In the end we only ended up using a paper map once in the field. However, they were very useful for describing our plans to our local guide for tips. We used the Austrian Alpenvereinskarte maps for the Cordillera Blanca Nord (1:100k), Cordillera Blanca Sud (1:100k) and Cordillera Huayhuash (1:50k). The large scale of these maps meant that it would have been difficult to rely on using tick-off features and other navigation tools since many streams and miscellaneous terrain features were not present on the maps. Maps in the guidebook "Peru's Cordilleras Blanca & Huayhuash - The Hiking & Biking Guide by Neil and Harriet Pike" were used in conjunction with the GPS for basic navigation, campsite information, daily hiking itinerary suggestions, local bus (autobus), minibus (combi), shared-taxi (colectivo) schedules/locations as well as information about locations of streams and glacial lakes for obtaining water.

4.1.1 Climate and Weather

The Andes have a wet season and a dry season. The wet season runs from November to March and the dry season (also called the Andean Summer) runs from May to September. For Huaraz (3058m), average rainfall in July is about 2mm and in August is about 7mm. Huaraz's climate is classified as "warm and temperate". Being so close to the equator, the temperature hardly varies throughout the year. We regularly experienced temperatures upwards of 20°C during the day in Huaraz. Low temperatures did not prove to be an issue at the more modest altitudes. We prepared well for cold, wet and windy weather. Nights were very cold at times. I believe we experienced temperatures of around -10°C and maybe even lower at the very highest of camps. We were glad to have extremely warm down sleeping bags.

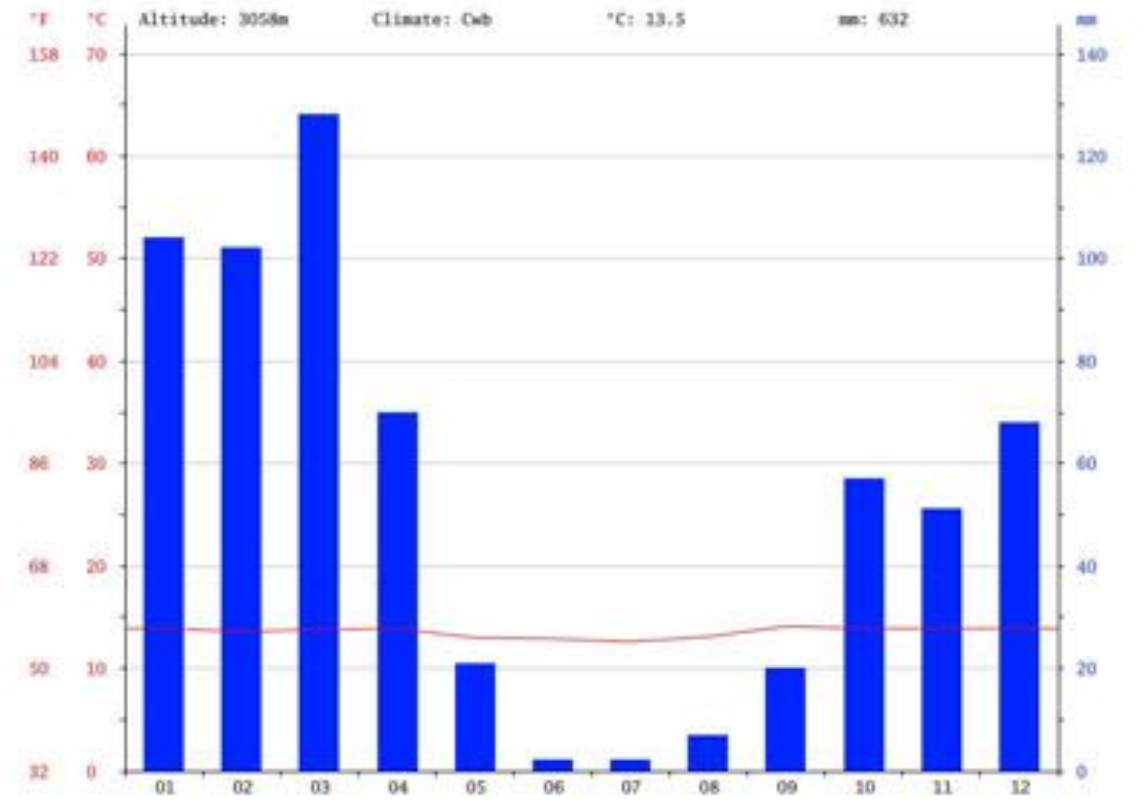


Figure 4.1: Climate data for Huaraz. The blue bars indicate rainfall in mm. The red line shows the monthly average temperature (day + night).

4.2 Terrain

4.2.1 Hiking

Ground conditions were mainly grassy, boggy and rocky especially around moraines. We didn't encounter many other hikers on the Santa-Cruz-Alpamayo trek, in fact we only saw one other group of German hikers (who we ended up joining for a while), some local fishermen and a solo German hiker.

4.2.2 Mountaineering

Obviously mountaineering involves walking over glaciers. On the ice climbing course we were taught how to adequately deal with the dangers involved with glacier travel.

4.3 Visas and Permits

We only bought one month long Huascaran National Park permit each for the entire expedition which proved sufficient.

4.4 Equipment

Please see Chapter 6 for a table of all the equipment we brought along bring.

4.4.1 Clothing

We both had high quality down jackets, a fleece, a waterproof jacket, waterproof trousers, several changes of socks and underwear, hiking trousers, water/sweat wicking shirts, thermals, gloves, sunhat, wool hat. See Chapter 6 for a more detailed list.

4.4.2 Camping and Sleeping

Camping is legal in the Huascarán National Park.

We used a 3 man MSR Elixir 3 tent. This turned out to be a good choice as we were able to accommodate our mountain guide César. We used 4-season down sleeping bags along with inflatable sleeping pads. We always had a 2-man blizzard bag will for emergencies. This proved to be particularly useful for day hikes and side trips (where we wouldn't carry a whole tent) and for bringing along to summit bids.

4.4.3 Cooking and fuel

We used a 2 person MSR cooking stove (MSR windburner duo). We mainly used this to make porridge in the mornings and to boil water for our freezedried meals. For the Santa-Cruz-Alpamayo circuit we brought along one small and one double sized gas cylinder. We only ended up needing the small gas cylinder for the entire 9 day journey.

4.5 Wildlife

We saw lots of grazing cattle and some wild horses. Other mammals that reside in the park include vicuñas (*Vicugna vicugna*) a type of wild llama, Andean Foxes (*Lycalopex culpaeus*), white-tailed deer (*Odocoileus virginianus*), long bushy tailed rabbits called viscachas (*Lagidium peruanum*), Pumas (*Felis concolor*) (extremely rare) and Andean bears (*Tremarctos ornatus*) (extremely rare). Avian wildlife includes condors (*Vultur gryphus*) (relatively common), hummingbirds, caracara (*Phalcoboenus megalopterus*) and Andean geese (*chloephaga melanoptera*).

4.6 Communications and Power

We used an Iridium extreme 9575 satellite phone (owned by Ben), that has an emergency function which relays the GPS position. We used disposable AA and AAA batteries and power-banks to charge phones and cameras. This worked well.

4.7 General Training

Prior to the expedition we maintained a good level of physical fitness by cycling at least 3 times a week and bouldering 2-3 times a week each. No hiking training was done, although perhaps should have been done. Ben did a National Navigational Award Scheme (NNAS) navigation course with Peak Mountaineering and achieved the silver award.

4.8 First Aid Training

Ben had done the marlin outdoor first aid training a few year prior to the expedition. We both completed the React First outdoor first aid course a few months prior to leaving.

4.9 Language

The main languages in the Ancash region are Spanish and Quechua (which used to be the primary language of the Inca Empire). We hardly spoke any Spanish, Ben knew some Spanish from the keystage 3 days. We managed to get by, but admittedly, the whole experience would have been more enjoyable if either of us knew more Spanish. We managed to communicate all the critical things (often by using google translate) but we were unable to engage in idle conversation.

4.10 Inoculations

We were up to date with the following inoculations: tetanus, polio, diphtheria, tuberculosis, hepatitis A, typhoid and rabies.

4.11 Hiking Plans

4.11.1 Santa Cruz - Alpamayo Circuit

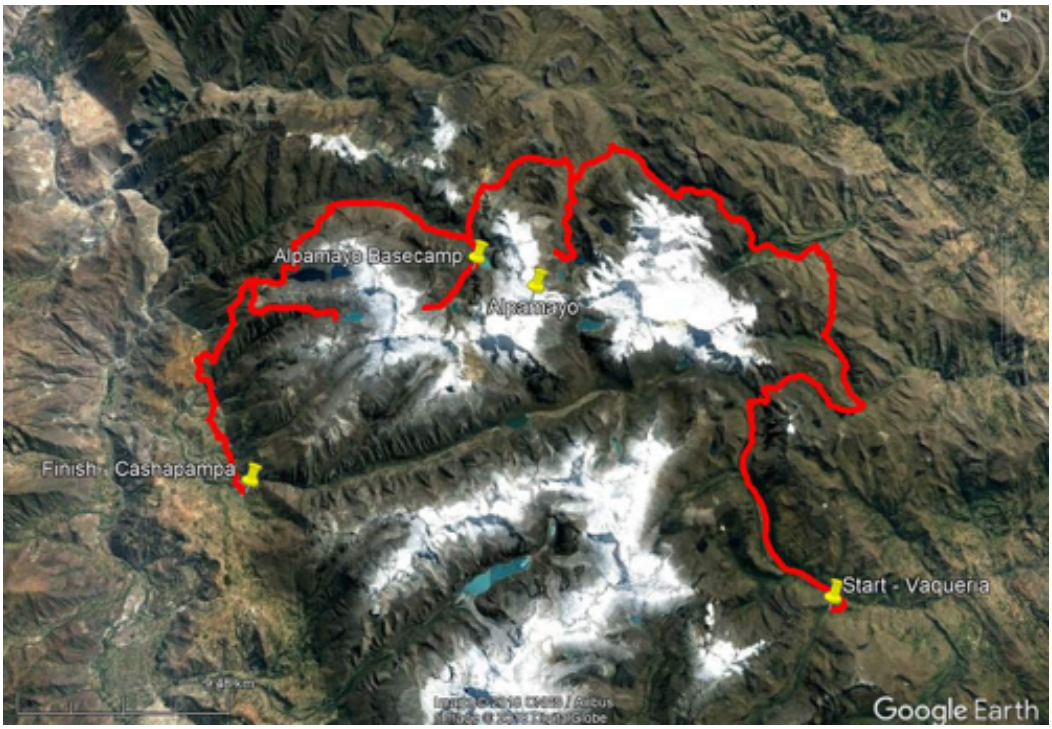


Figure 4.2: Birds Eye view of circuit with points of interest marked. Taken from Google Earth.

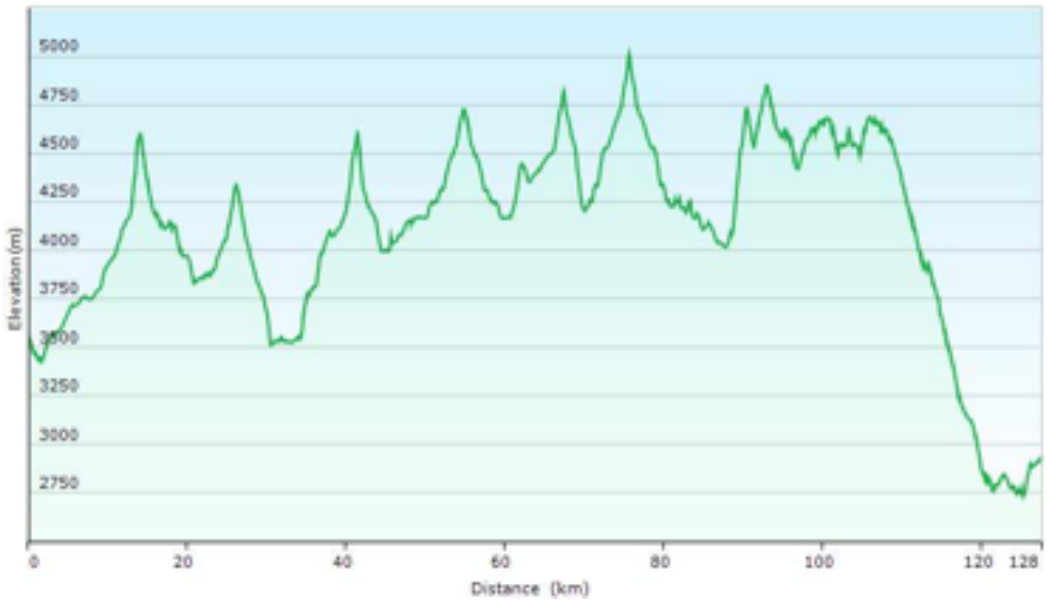


Figure 4.3: Elevation profile of the circuit starting at Vaqueria. Generated using Garmin Basecamp.

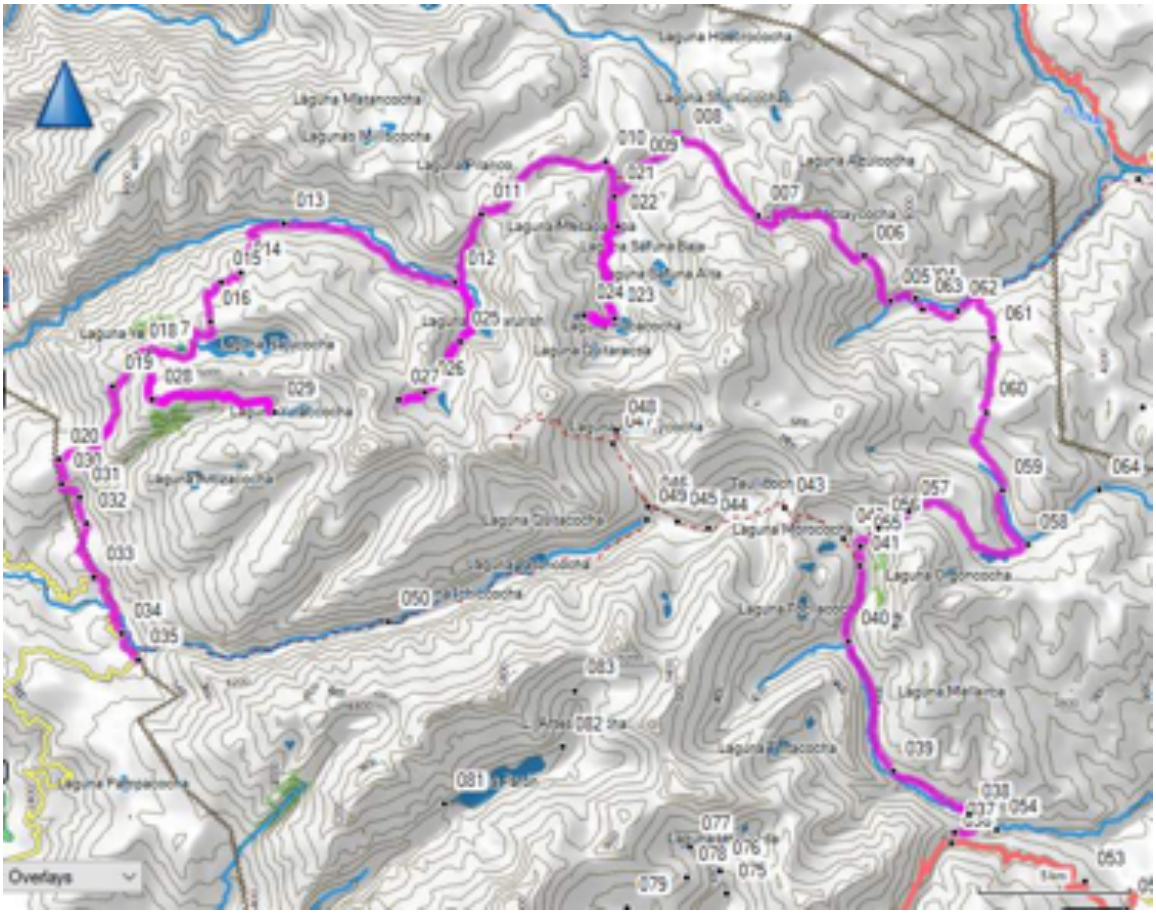


Figure 4.4: Topographic map with the trail marked in magenta. The numbered points are GPS markers which assist in navigation and point out campsites, high passes and other points of interest. Map taken from a screenshot of the Garmin "Basecamp" GPS software. More topographic detail is visible on smaller scales. The basemap and tracks shown in this and subsequent figures has already been transferred to a working GPS unit (Garmin etrex30).

4.11.2 Huayhuash Circuit

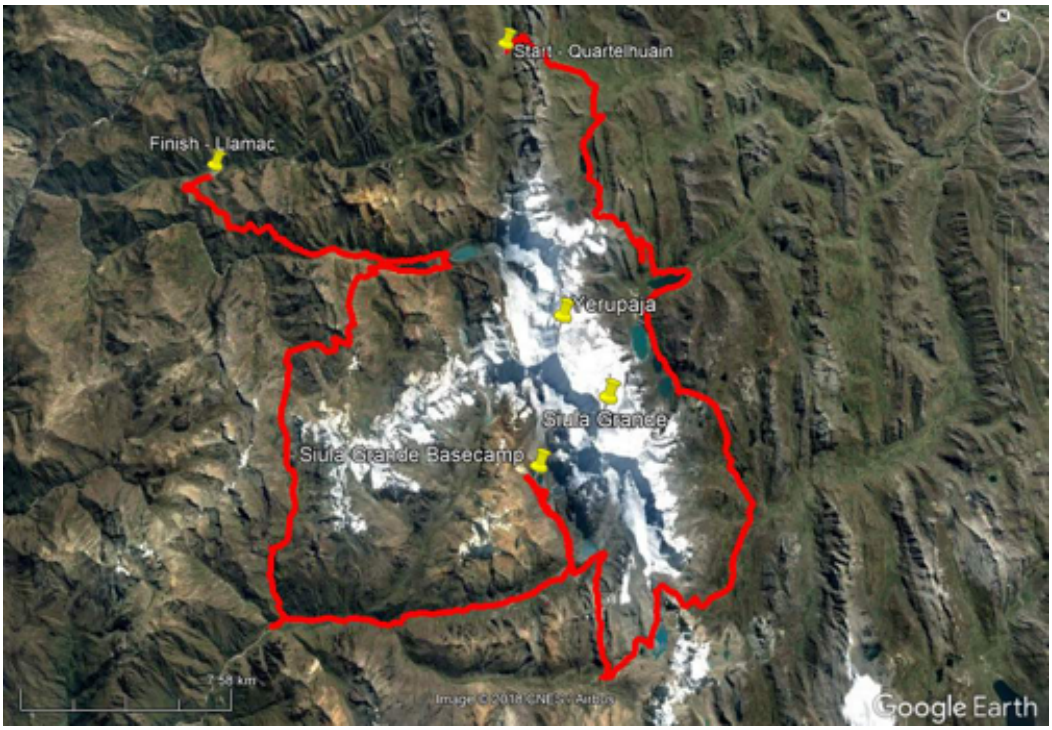


Figure 4.5: Birds Eye view of circuit with points of interest marked.

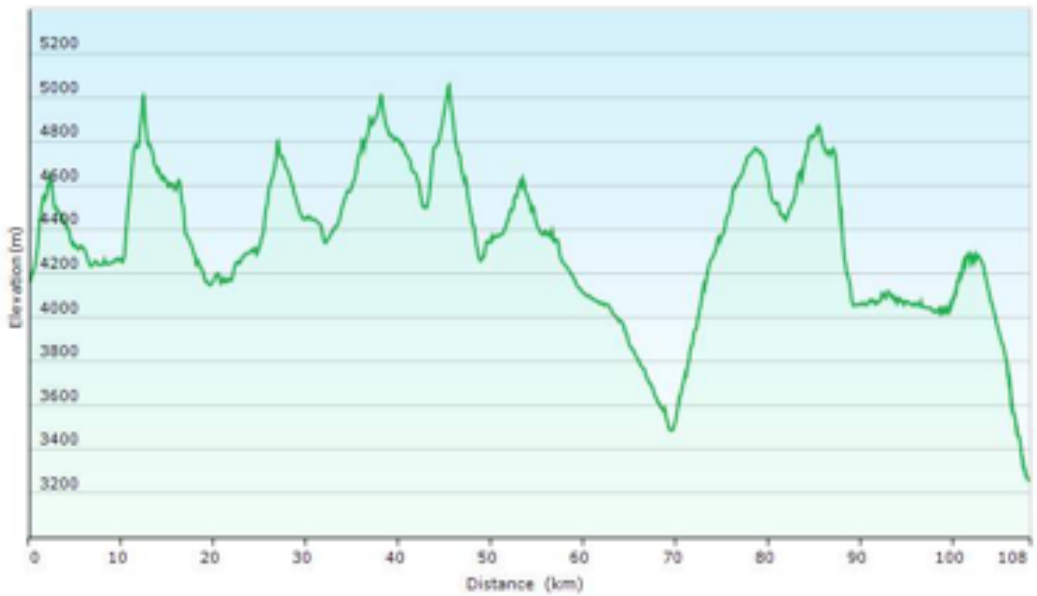


Figure 4.6: Elevation profile of the Huayhuash circuit trek starting at Quartelhuain. Generated using Garmin Basecamp.

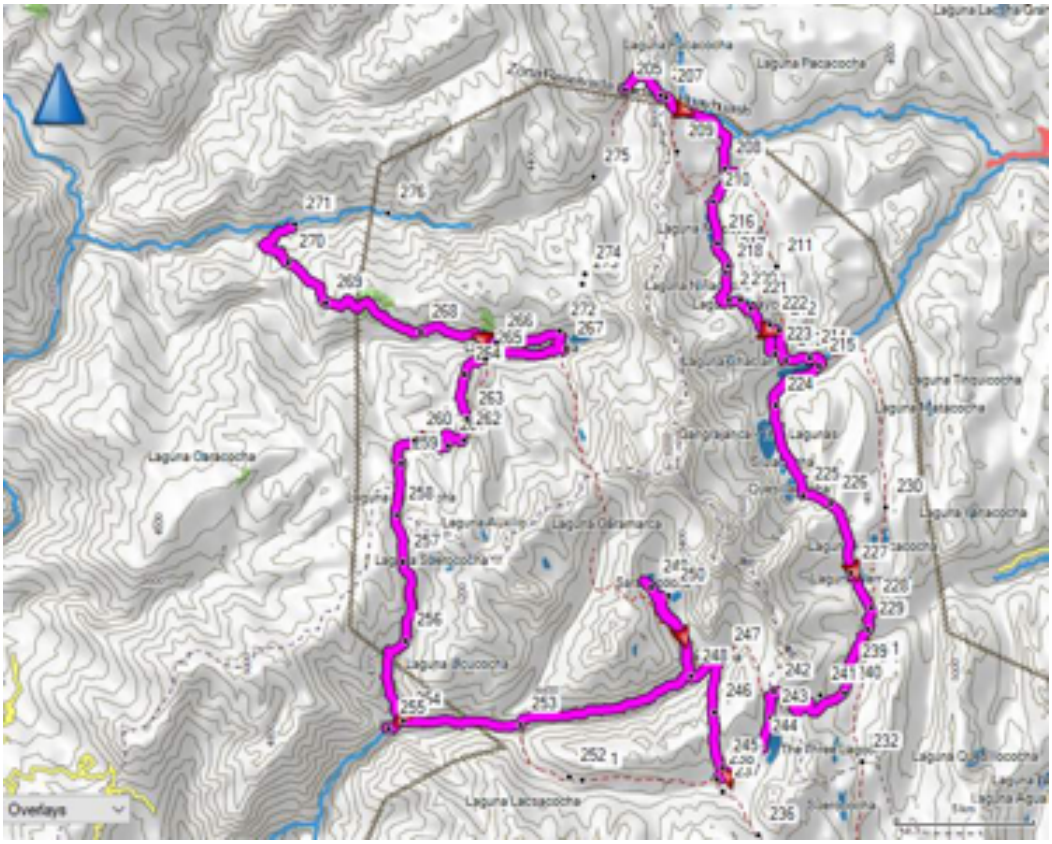


Figure 4.7: Topographic map with the trail marked in magenta.

4.11.3 Quebrada Carhuascancha

Figure 4.8: Birds Eye view of trail with points of interest marked

Figure 4.9: Elevation profile of the Quebrada Carhuascancha trek starting at Quartelhuain. Generated using Garmin Basecamp.

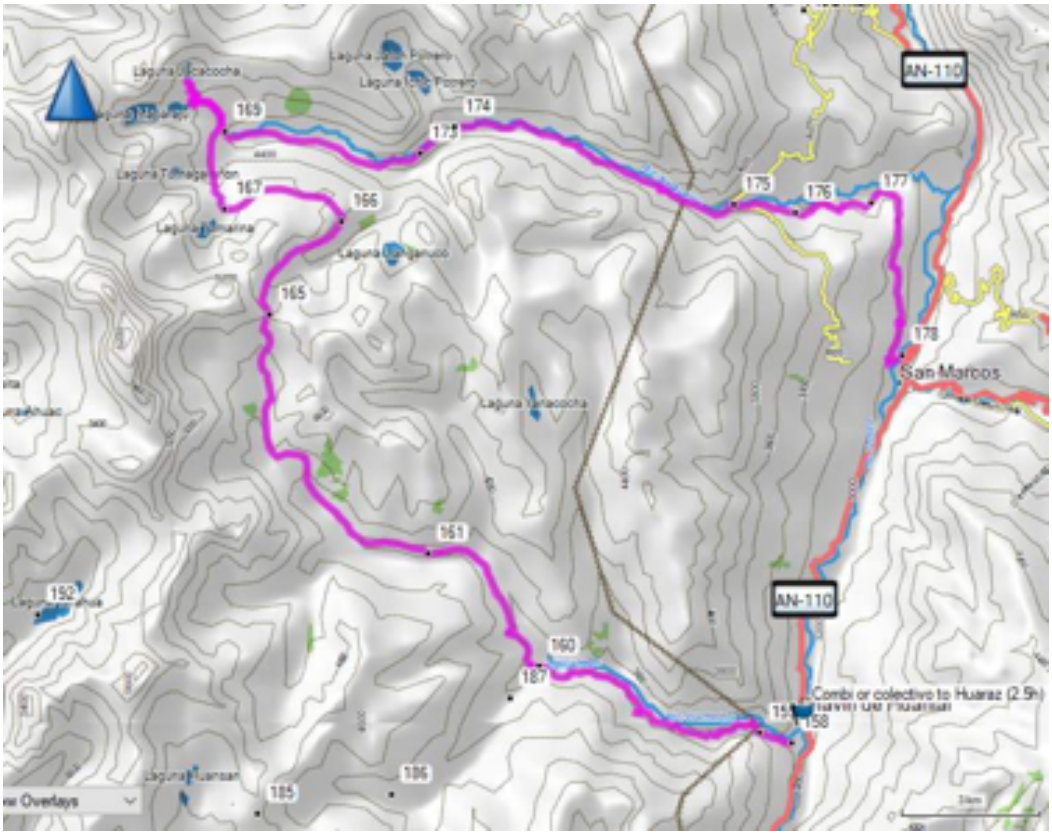


Figure 4.10: Topographic map with the trail marked in magenta.

5. The Expedition

5.1 Logbook

14/07/18

After a few "test packs" on previous days to check if we could take everything we wanted to take, the day had finally come to pack for real. I frantically double and triple checked all my equipment. The prospect of living from a backpack for 7 weeks seemed extremely exciting.

28 1000kcal freeze dried food packets each from Expedition Foods. In hindsight 2 weeks worth of food each was probably a bit overkill and 1000kcal for lunch really didn't seem necessary. We highly recommend Expedition Foods, however. The meals were surprisingly delicious.

15/07/18

We had a 12h30m flight to Lima, then 3h after arrival in Lima we took an 8h bus to Huaraz.

16/07/18

We arrived in Huaraz at around 6am and checked in to our hostel. As soon as the sun came up we were immediately greeted by stunning 5000-6000m peaks. Huaraz appeared to be lively and charming, albeit poverty stricken. We passed the day by buying food and fuel for our acclimatisation hikes. We also checked the locations of all the supposed "combi" (local small minibus) stops we intended to use to get to the trail heads. Some stops were difficult to find, there aren't any signs anywhere telling anyone where to go and at what times the combi's come by. Having the guidebook was very useful.

Views from the Huaraz plaza de armas.

17/07/18

We went to Wilcacocha lake today for an acclimitisation hike (about 700m of ascent). The going was good, the views were excellent and we saw an alpaca! Tomorrow we have our last day of acclimatising.

At the top of the lake Wilcacocha hike. Alpaca!

18/07/18

We woke up early to catch the bus to the start of the lake Churup trail. It took about an hour on the bus from Huaraz (3000m) to arrive at around 3700m at the trail head. From there we climbed up to 4500m to lake Churup. The lake appeared stunningly turquoise and was accompanied with an impressive backdrop of mount Churup.

We started to feel the effects of mild AMS on the way down (quite a bad headache but not much else).

Back in Huaraz we waited out our headaches. We planned to either take a rest day the following day or head to Yungay (where we would be able to catch a bus to the trail head of the Santa-Cruz-Alpamayo trail - Vaqueria) on a very early bus where we would overnight.

Lake Churup (4500m) with mount Churup in the background.

19/07/18

What a day! There was a change of plan. After learning from the hostel manager that buses leave from Yungay to Vaqueria at a leisurely 1pm, we decided to head straight to Vaqueria. The first bus to Yungay was terrifying (although Kenneth seemed unphased). Just imagine overtaking a lorry and 2 SUV's on a road just wide enough for 2 vehicles at 100kph around a bend without seatbelts. After miraculously surviving the first "crazy combi", we waited about 3h to get onto the bus from Yungay to Vaqueria.

We didn't want to leave our bags with the bus driver even though he insisted it was safe. Our bags were eventually precariously strapped to the roof of the minivan alongside some live chickens and other miscellaneous items. I was quite worried our bags would fall off the roof.

The Journey was not very comfortable (Kenneth said he barely survived it), it was boiling hot, cramped and stuffy. The view however, was incredible. The views of the Llanganuco valley leading up to Vaqueria were awesome. I have never seen such a steep and tall valley in my life.

It was another 3h on this bus before we arrived in Vaqueria (3700m) at the trailhead of the Santa-Cruz-Alpamayo circuit. We were immediately greeted by a very friendly lady who offered us food and shelter.

Views of the incredible LLanganuco valley on the way up to Vaqueria.

20/07/18

First day of Santa-Cruz-Alpamayo circuit. We decided to play it safe with the altitude and camp at Paria (3800m) instead of Tuctupampa (4100m). Carrying 10kg of food and water is hard it turns out (in hindsight we should have brought less food). We looked forward to an early start the next day and potentially around 7h of hiking. Our contingency plan was camping at Tuctupampa.

Huaripampa Valley.

21/07/18

We did not end up stopping in Tuctupampa at around 4100m. After Tuctupampa we passed the tiresome Alto de Pucaraju pass (4640m). Views on the other side of this pass were very nice but we were too tired to fully appreciate them. When we reached the top it was still quite a while to our next camping spot, Laguna Huecrucocha (3950m). We probably bit off a bit more than we could chew and we probably should have just stopped at Tuctupampa, especially since we had ample provisions.

(a) Looking north towards Taulliraju from Tuctupampa.

(b) Looking east from the top of Pucaraju pass.

22/07/18

We decided on a rest day at the lake. Relaxing by the lake was quite nice. We had loads of hours on the prepaid sim of the sat phone and managed to call our parents while the weather allowed. We also managed to make a canine friend who presumable lives at the nearby trout farm.

Kenneth and the dog at lake Huecrucocha, our second campsite.

23/07/18

Today we headed north to the Tupatupa pass at 4360m. On the way we met a couple of friendly German hikers, Dennis and Miriam, who provided us with some welcome human company. The trail was quite hard to find at times. We were very glad for the GPS; it's hard to navigate with a 1:100k map... After getting over the pass we passed through a small Andean village, Pishgopampa, where we were able to buy some gatorade and additional breakfast ingredients. *Pampa* is a Quechua (the local language) word for "plain". These plains usually get very boggy after a small amount of wet weather.

We hadn't been too lucky with the weather so the next few hours involved finding our way through a maze of bog and rivers to get to the other side of the pampa where our campsite would be situated. Shortly after reaching the village the weather took a turn for the worst, it started to hail quite badly. The big torrent of a river that dissects the pampa turned out to be in a completely different place on our GPS than it ought to have been. For this reason we ended up traversing half the pampa twice in

order to navigate around the river. Eventually we made it to the campsite where we were greeted by Dennis and Miriam once again; they had the same difficulties with navigating around the river as we did.

(a) Views of the Tuctubamba valley leading towards Tupatupa pass.

(b) Looking towards the Pucajirca peaks from TupaTupa pass.

24/07/18

We woke up early to get ahead of our speedy German compatriots (but not for long... They overtook us when we stopped for lunch by a river with wild horses nearby). We followed the Yanajanca river to the Yanacon pass (4610m). We eventually descended into another beautiful pampa, Huillca (4000m), with loads of sheep and alpacas. We chatted with our new German friends, listened to some good music on a proverbial tin can and had good freeze dried food. Life wasn't too bad.

(a) Wild horses near Yanajanca river.

(b) Small rural settlement of Huillca. We set up camp a few hundred metres west of these ruins.

25/07/18

On the cards for today was over 1km of vertical ascent at altitudes of 4000m+, needless to say, it was going to be a tough day. It was also an extremely rewarding day. We had terrific weather, this

couldn't have come at a better time as today we were supposed to see some of the trek's best sights. From the first pass, Mesapata (4460m), we had stunning views of Pucjirca East and West. Getting to the top of the second pass, Garagara (4830m) was tough. I was feeling slightly hypoxic on the way up (slight dizziness, very slight headache and heavy breathing). Getting to the top was incredible, the winds were as strong as I've ever experienced them and the views were breathtaking. On the way down we had to cross a very small bit of snow on the path. After descending 600m we reached Jancarurish camp in good time (at about 3pm).

Jancarurish camp was amazing, it is situated in a beautiful valley with brilliant views of Alpamayo. Seeing the spindrift blow off the peak of Alpamayo provided ample entertainment. We were later told that a mountaineering disaster where several people died due to an avalanche took place on Alpamayo about two weeks prior to us getting to this point of the trail. A few weeks after getting to the end of the trail, more people died on Alpamayo which resulted in it being closed to the season.

We met some friendly Canadians who had parked their van at the trailhead. They were planning on traveling from Canada to Patagonia (potentially visiting Antarctica). That night we played around with some nighttime photography.

(a) View of the Pucajirca mountains from the Mesapata pass.

(b) View from the top of the Garagara pass of the Santa Cruz massif.

(c) Spindrift blowing off the top of the pyramidal Alpamayo.

(d) Long exposure of alpamayo, the moon and the stars.

26/07/18

Today we left the beautiful Jancarurish camp to climb to the Alpamayo basecamp at 4520m and beyond to 5020m (first time above 5km!). The views of Alpamayo remained stunning - it's an almost perfect pyramidal structure, a real freak of nature!

Later I briefly left Kenneth on his own at around 4600m (he was feeling slightly nauseous) while I climbed up to the moraines leading up to the Santa Cruz massif. I heard the occasional avalanche whilst going up. From 5020m I was met with stunning views of Alpamayo, Jancarurish, Tayapampa and more. I had some trouble sleeping that night (insomnia is one of the most annoying results of staying at high altitudes).

(a) Looking at peaks of Quitaraju, Alpamayo, Jancarurish and Tayapampa (right to left) from 5000m.

(b) Walking back from the Alpamayo basecamp to the Jancarurish camp.

27/07/18

We had another big day. We followed the Quebrada (South American Spanish for "mountain stream") Alpamayo for 2h30m to the start of a grueling 800m climb of infinite zig-zags to pass Vientunan (4770m). From there we descended 200m to Osururi camp at 4560m. This was quite a beautiful campsite once again. We finally manged to wash ourselves in one of the coldest streams I have ever touched.

The altitude made it very difficult for us to sleep. I'm not sure I slept at all that night. I also had a slight headache and breathing seemed quite laborious. It seemed like it might have been the awareness of the AMS symptoms themselves which contributed to keeping me up. I often got up in a slight panic worrying that I wasn't getting enough oxygen. Being a bit of a hypochondriac, I did a few occasional mental and physical drills for testing for symptoms of High Altitude Cerebral Edema (fluid in the brain).

Sunset from the Osuriri camp.

28/07/18

In our plans for this day we intended on camping at 4300m and to attempt a scenic side-trip. After the disastrous night, we were both mentally and physically exhausted and decided to forgo the side trip and get to the end of the trail prematurely. This was definitely a good decision. In the early hours we still had to ascend 300m to reach Osoruri pass (4860m). I felt very dizzy and ascending only a

few vertical meters was an incredible effort.

After getting to the end of the trail in Hualcayan (3140m) we managed to get a random guy in the village to transport us to the village of Caraz (2200m) where we spent the night. Getting down to 2200m was a wonderful relief from the thin air of the high Andes. The ride to Caraz was very beautiful and quite enjoyable. Kenneth and I were both feeling pretty "hiked out" at this point, so we vowed to spend at least the next week or so doing something else and to perhaps hire some muleteers for the Huayhuash circuit.

We arrived in Caraz on independence day. We stayed at a delightful hostel with much appreciated beds, toilets and showers. We ate like kings that night. We had roasted chickens with chips, salad and beer. To top it off we had 6 scoops of ice-cream each.

(a) View of the Santacruz massif on our last day on the Santa-Cruz-Alpamayo trail.

(b) Eating like kings in Caraz.

29/07/18

We returned back to Huaraz but couldn't really get much organising done as it was a Sunday so all the agencies and the house of the guides were closed.

30/07/18

Being enticed (one could say taunted) by the incredible white peaks constantly surrounding us, we inquired at the house of the guides about mountaineering courses as well as information about muleteers and mountain biking. The guide we spoke to (César) was extremely nice and very, very helpful. We decided to book a day of mountain biking for the 31st. We also decided to book a 4 day beginners ice climbing and mountaineering course on which we would be able to learn crevasse rescue techniques, ice climbing, avalanche awareness and to summit at 5500m mountain, Yanapaccha!

31/07/18

We woke up at 6:30 AM to go mountain biking. We followed a guide all the way from Huaraz to Pitec at the start of the Lake Churup hike. It was a very tough 800m of vertical ascent, but the rewards were awesome. We eventually descended down a technical single-track MTB trail christened

“acupuncture trail”. The trail owes its name to the many thorny bushes that one rides through along this downhill route. We had to ride down lots of rocky stairs, ride over big rocks and avoid lots of aggressive dogs. Kenneth and I both fell once. I suffered a few scrapes and a slight headache after accidentally going off trail for a second. Kenneth apparently went over the handlebars but suffered no injuries. It was a good day.

01/08/18

Today we sorted out food and equipment with our guide for our ice climbing trip with César. During the food shopping we were a bit concerned that César was buying way too much food (with our cash), at least we would eat and drink like kings... We rented crampons, technical ice axes, gaiters and mountaineering boots and packed our bags for the ice climbing trip.

02/08/18

We got up at 7am to get a taxi with our guide to the start of the trail to Yanapaccha basecamp. It was quite a tough 3-hour hike with laden backpacks to eventually end up at 5000m at our basecamp where we set up camp and slept. The basecamp of Yanapaccha is incredible! We had the best views of the expedition so far. It surprised me that the hike to this basecamp is not mentioned in any of the trekking guides I’ve seen. It was quite nice not to have to think about doing the cooking myself. Moreover, César insisted on constantly boiling batches of water. We would add calories by spooning in copious amounts of honey. César enjoyed calling himself the “sugar daddy”.

It got very cold nearer to sunset but surprisingly we didn’t have any altitude issues and slept as well as we could have hoped at 5000m (patchy, but sufficient sleep).

03/08/18

We were introduced to some basic concepts of mountaineering, learned how to self rescue from a crevasse using prussik knots and we practiced some knots that would later prove useful for crevasse rescue. We also both had our first ice climbing experience on a top-rope. As it turns out, ice climbing is quite hard work! Efficiency is key!

04/08/18

We woke up again at about 6:30am to copious amounts of hot drinks. At around 8am we set off for the glacier where we would practice crevasse rescue techniques. We deliberately went a way littered by crevasses all around. This was quite an experience. At one point, after climbing a 5m ice wall, I fell with one foot through the snow into a crevasse, I managed to lift my foot out and all was well. I warned Kenneth about the crevasse but he nevertheless sunk in with his entire lower body, only his head and shoulders were exposed above the snow. With the help of César and myself pulling on the rope, he managed to get himself out.

The crevasse rescue technique César showed us was quite complex. Its purpose is for rescuing an incapacitated team member who is stuck in a crevasse. This is accomplished by first halting ones own acceleration towards the crevasse by quickly planting both crampon heals into the snow and leaning backwards. A T snow anchor is then made using a snow picket (or ice axe if you don't have a picket) followed by a 7:1 pulley system with carabiners and prussik cord. The next day would be summit day.

Moraine basecamp of mount Yanapaccha (5460m). In the background you can see the Incredible mount Chacraraju (6100m), a terrifyingly awesome, but difficult and deadly Andean peak.

The Yanapaccha glacier from the basecamp.

Our guide César at the summit of a roped-up practice scramble.

05/08/18

We woke up at 2am, a true alpine (or should I say Andean) start. We did this primarily for the reasons of optimal snow conditions, i.e. nice hard, crunchy snow that's good to walk and climb on. Avalanche risks are also a lot higher with soft snow.

View from the base of the glacier looking up towards Yanapaccha. The red line is the rough route to the summit which we would be taking the next day.

In true Murphian fashion, as soon as I reached the glacier, the zip of my hardshell decided to break rendering it pretty much useless against the wind. Good thing I was also wearing a windproof midlayer.

Walking on a moonlit glacier with the southern stars and nebulea encompasing my skywards field of view was quite an awesome experience. Cramponing up steep snow slopes at 5400m is no easy task though... After a couple of hours walking up 0-60°slopes we got to a small section of vertical snow. To get over it I had to swing both ice axes over the top, trust them, then subsequently haul myself up. This was quite scary as I had no idea whether the snow or my axes would give way; our guide was belaying us from the top though. Once over this obstacle, it was a short easy walk to the summit (at about 5500m). We reached the summit just before sunrise but unfortunately it was cloudy and we couldn't see much. It didn't take us long to get down again and we left basecamp at around noon, had a feast of local Quechuan food and arrived in Huaraz at about 5pm.

(a) Cheeky selfie on the summit of Yanapaccha just after sunrise.

(b) Views of Chacraraju and Piramide coming down from the summit.

06/08/18

Today we pretty much just slept and ate. We were still quite exhausted from our summit bid and the ice climbing course in general. We still had over a month left in Peru which meant we still had ample time to do the Huayhuash circuit, our other main goal.

07/08/18

We pretty much spent this day trying to figure out what to do with the time we had left in Peru. We were quite keen to do some more mountaineering and to potentially organise muleteers for the Huayhuash circuit trek. We had a chat with our guide who encouraged us to try "Pisco" by ourselves. Pisco is a non-technical 5750m mountain about 60km north of Huaraz in the Cordillera Blanca. He recommended we talk to him closer to going on the Huayhuash circuit trek to organise mules. He also mentioned guiding us up a mountain called Tocllaraju (rated D/D-) as the next step up from Yanapaccha, we were both quite keen to do this.

We decided we would spend the follow days in Chavín de Huántar to visit the UNESCO world heritage ruins of the pre-incan, jaguar worshiping civilisation that used to reside there and also to check out the area of the Quebrada Carhuascancha hike.

08/08/18

On this rainy day we took a bus to Chavín and checked out the ruins and museum. The ruins were quite fascinating. The Chavín culture believed in using psychotropic drugs through cacti in order to connect to a higher existence. Archaeologists have also uncovered evidence of burnt human remains, presumably of sacrificial origins. Chavín is quite a sleepy little village. Apart from a ‘wild’ children’s party there was no night life to speak of. We decided to leave the following day.

09/08/18

Kenneth (understandably) wasn’t too keen on trying Pisco by ourselves. There were a bunch of climbers staying at our hostel who told us about places like “Hatun Machay” and “Los Olivos”. The former is an archeological site as well as a sport climbing paradise. The latter is a crag on

the outskirts of Huaraz with sport climbing as well as bouldering. We decided to buy a climbing guidebook and organise equipment hire for the next day for sport climbing and bouldering.

10/08/18

We managed to find a taxi driver who was willing to transport two bouldering mats in the boot. It was a short drive to Los Olivos and thankfully the taxi driver knew which way to go to get to the crag. We started with some easy 5+ and 6a's. Neither of us do much sport climbing (we mainly go bouldering) so we found that, especially after almost a month in Peru, we didn't have the endurance to tackle anything much more difficult than a 6a+. We did a little bit of bouldering, Kenneth managed to do a V5 I think. I almost did a V3. We tried a 6b sport climb after the bouldering. Thankfully Peru is ubiquitous with friendly Germans. This time we convinced some friendly Germans to clean our route.

Kenneth was a bit put off by our sport climbing experience (he is used to flashing V5's) so he wasn't too keen on giving Hatun Machay (4200m) a try. I, however, was very keen to go to Hatun Machay, it seemed like a very interesting place. When we got back, I visited all the reputable guiding companies and put my name up on their notice board asking for a Hatun Machay climbing partner.

11/08/18

Kenneth managed to find a temporary volunteering position at the hostel we were staying at, he seemed pretty keen on helping out around the hostel while I was away climbing at Hatun Machay. Furthermore, I met (could you have guessed) another friendly German at our hostel. This particular man goes by the name of Frank Kaminski (AKA Frank from Frankonia). Frank mentioned that he was looking for alpine climbing partners to try the non-technical peak of Ishinca. I mentioned that I was keen to climb Pisco. We made plans to climb Pisco for when I got back from Hatun Machay. He didn't want to go to Hatun Machay or Pisco right away because he still wanted some extra time to acclimatise. I decided that if I didn't get a climbing partner for Hatun Machay by the end of the day that I would just go by myself and try to find some people to climb with at the crag. Alas, I did not manage to find a climbing partner.

12/08/18

I took an early morning bus to the town of Catac from where I got a taxi directly to the disused refuge. In the early 2000's an Argentinian climber named Andrés Saibene realised the potential of climbing at Hatun Machay. He received permission in 2006 from the local community to run and build a hostel on the property as he developed the climbing in this area. In 2014 a disagreement between Saibene and the local community arose which resulted in Saibene being evicted and subsequently vandalising the refuge and chopping the bolts of a lot of the easier routes. About 100 routes were vandalised but 300 remain. The refugio is no longer in use so I had to set up camp by the vandalised building.

I spent the rest of the day walking around, visiting some archaeological areas and trying to see if I could convince some people to let me climb with them. I wasn't so successful, but later that evening I met a very friendly bunch of Argentinian and Spanish climbers who agreed to take me under their wing the next day.

The night was very cold, the coldest I had experienced thus far. It seemed much colder than

the Yanapaccha base camp, perhaps because I didn't have the shared body heat of two other people in the tent. I was still a bit cold in my 1kg of down, -11°C comfort rated sleeping bag, 4 season sleeping mat and all my layers. It must have gotten to around -15°C that night.

(a) View of Hatun Machay from the refugio

(b) The milky way silhouetted by the cordillera negra.

13/08/18

There was a lot of faff in the morning and we didn't set off to climb until about 11am. The refuge dog followed us all day and was welcome company. We warmed up on an easy about 20m wall of 6a-6b's on the west side of the crag. The rock was quite interesting. Admittedly, I hadn't done that much outdoor climbing before coming to Hatun Machay; however, the odd, notched, bubbly shapes of rock that covered the walls seemed quite unique and made for an enjoyable climbing experience.

A lot more faff ensued before we got to the days main objective. The crag we went to was called the "milky way". It was an approximately 10m high wall with some overhanging sections. I managed to do a 6b and fail many times at a 6b+. Climbing at 4200m is quite exhausting. On the way back to the camp later that evening we visited some of the archeological sites. Not wanting to stay another cold night at 4200m I decided to pack up to try and get an elusive bus at the base of the walk up to Hatun Machay which apparently arrives at around 6pm most days. My contingency plan was just to set up camp somewhere by the road or to hitch my way to Catac. I was quite lucky to find an empty combi coming down the zig zags and I managed to get a ride all the way to Catac to catch another combi back to Huaraz that night. The following day I would meet up with Frank to organise our Pisco trip.

14/08/18

Frank and I spent the majority of the day organising rental equipment (ice axes, rope, crampons, boots, helmet, carabiners, prussiks, slings, belay devices, etc.) and buying food for the Pisco trip. We also chatted to César for general information about the climb. We found out that we could book a spot on a tourist bus to the "laguna 69" trek. Every morning bus loads of tourists visit laguna 69. The buses for laguna 69 conveniently stop at Cebollapampa at the trailhead to the Pisco refugio.

(a) Walking with the Argentinians to the first warm up wall.

(b) The Argentinians climb some more interesting routes at "the milky way" while I'm having a rest.

(c) The refugio dog in front of some archaeological rock etchings.

(d) Walking back to the disused refugio with newfound friends.

15/08/18

We woke up at 4am to catch the 5am laguna 69 bus, stopping for breakfast along the way. From Cebollapampa, the hike up to the refugio was quite tiring as we were carrying a lot of gear. At the Refugio we refueled and spoke to some guides about the climb. We were surprised to find out that a brave German girl, completely new to mountaineering, managed to solo Pisco earlier in the morning.

There was the option of overnighting in the refugio and making the summit bid a bit earlier in the morning. However, we had heard of a particularly precarious and precipitous section of the moraine leading up to the glacier base. We decided we would just camp on the moraine, close to a lake near the base of the glacier. This was a good decision. The precarious bit of moraine was extremely steep and slippery but did have an in-situ chain which was very useful. It was difficult to negotiate with heavy backpacks. For this reason we decided to belay the bags down the steepest section. It was about one to two hours from this point to our campsite. There was very flat section of moraine at the top of the hill which lead down to the lake which was a perfect campsite which could only fit one tent.

After setting up camp we headed over to the glacier to practice some anchor making and crevasse

rescue and to get familiar with the route to glacier.

We started heading back to our camp at about 6pm when the sun was setting. Collecting water at the lake was very awkward. I was using a water filter which required squeezing water from a bladder. Unfortunately the bladder had a small hole in it and it was very difficult to collect a decent amount of water without getting it and myself extremely muddy. After loads of faff and taking turns we managed to collect about 6L of filtered water for cooking and drinking. I was particularly surprised at how warm it was here (at about 5000m) compared to Hatun Machay and the Yanapaccha base camp. After cooking, it was still too early to sleep so we faffed around with taking some night-time pictures of mount Pisco.

(a) Frank on the Pisco moraine. Pisco in the background.

(b) View of the lake and Pisco from our moraine campsite. The weather was significantly better the day before the summit bid.

16/08/18

We woke up at 3am to a relatively cloudy sky, it wasn't a great start. I vowed from the start that if it got too cloudy that we would head straight back.

It was a little bit difficult to navigate to the correct bit of glacier from our camp in the pitch-dark. Thankfully, I eventually managed to find the big cairn under which I stored my glacier gear. The weather hadn't deteriorated significantly so we roped up and followed the tracks in the snow towards the col. The weather momentarily seemed to improve. We were optimistic and took some pictures. It was an epic event. We enjoyed the endless snow, mountains all around and the big patches of the clear, starry southern sky. There was something very liberating about not just mindlessly following a guide. Shortly after reaching the col we realised the weather wasn't improving, we had about 4m of visibility.

After ascending to about 200 vertical meters from the summit I started to feel really uneasy about the weather. I decided to listen to my intuition and shouted to Frank to stop and to turn around. It took a little bit of persuading, but I'm extremely glad we turned around. On the way back, the wind, snow and clouds were making it somewhat difficult to follow our tracks back to the base of the glacier. I pulled out my GPS and started following the line it recorded while we were ascending, I was very

Ben on the base of the Pisco glacier. Credit: Frank Kaminski

glad to be able to fall back on my trusty little gadget at this point. We quickly managed to find our way back to the start of the glacier, we were both somewhat disappointed but happy to be off the glacier at the same time. The moraine seemed so tame and safe compared to the treacherous snow and ice.

As we were walking back we noticed huge avalanche thunder down Huandoy, a mountain adjacent to Pisco. It was another sobering reminder of the hazards associated with glacier travel.

We eventually arrived back at the refugio, telling the staff about our experience. We celebrated our attempt with some beer and chips followed by a nap. We chatted to another German girl who was planning to solo Pisco the following morning; wow.

17/08/18

We had the liberty for copious faff in the morning as the bus leaving from Cebollapampa only left at 3pm. We ate well at the refugio before eventually heading off. We rocketed down the trail to reach the Cebollapampa river and we eventually boarded the bus. We had a flat tire, but we eventually managed to get back to Huaraz in time to return all of our rented gear.

18/08/18

Earlier, Kenneth and I realised that we would still have time for the Huayhuash circuit and be able to climb another mountain with our mountain guide César. We had been in contact with César via Whatsapp in the days following our Yanapaccha summit to organise an attempt on Tocllaraju (6034m) (grade D-/D). César met us at 5pm (having just come back from another summit attempt with a client) to do the gear organisation and food shopping.

(a) On Pisco's glacier, near the col just after sunrise. The visibility was looking a lot better at this point.

(b) The weather can change spontaneously without warning at these altitudes in the Peruvian Andes. This is what I could see on the way down from the summit after we decided to turn around.

(c) Ben on Pisco's glacier.

(d) The Pisco refugio with a backdrop of Pisco shrouded by clouds.

The following day we would be off to the Ishinca valley and the day after to basecamp of Tocclaraju.

19/08/18

We departed in a taxi with César at 9am to Pashpa where we would begin our hike into the Ishinca valley. We arrived to beautiful blue skies accompanied by an incredible view of Huascaran, Peru's highest mountain (6768m). César had organised mules for our trek to the Ishinca refugio; we wanted to be fresh for the next two days of hard ascending.

As we approached the valley, we slowly lost the view of Huascaran, but simultaneously gained views of Urus, Ishinca, Ranrapalca, Palcaraju and of course Tocllaraju (the Quechua word "raju" roughly translates to snow-covered peak). Tocllaraju really appeared to tower above all the other mountains, it seemed a bit unreal that we would be attempting to go there in two days time. We stopped for a lunch of avocados and bread (which tasted incredible) at about halfway and we soon arrived at the refugio (4390m). At the refugio we ate like kings and prepared for the grueling 1110m ascent up to

the Tocllaraju basecamp which we would have to do the next day.

(a) We prepare for a relaxing walk through the Ishinca Valley with the aide of mules.

(b) Views of Tocclaraju (in the clouds) and Palcaraju as we walk through the Ishinca Valley.

20/08/18

It was a long and arduous hike up to the moraine camp at 5500m. Despite a more than adequate degree of acclimatisation (having just come back from my Pisco trip and not noticing any altitude problems), the 1km+ ascent took a lot of mental discipline and a "mind over matter" attitude. We were probably each carrying over 25kg of food and equipment. Getting to the moraine camp was quite a relief.

After about an hour or so I started feeling quite nauseous, which I found strange given my level of acclimatisation and lack of headache or any other AMS symptoms. I took some medication for the nausea and it seemed to get quite a lot better.

We melted snow for water and "sugardaddy" again encouraged us to consume copious amount of honey with our many, many hot drinks. We would wake up at 2am the following morning. I'm not sure I got any sleep.

(a) Near the Ishinca refugio.

(b) Near the end of the 1110m ascent to the basecamp of Tocllaraju at 5500m.

(c) César posing at the moraine basecamp.

(d) views of Tocllaraju and Palcaraju from basecamp at sunset.

21/08/18

Ah 2am. After an hour of breakfast and faff we were kitted up, roped up and on the glacier ready for the supposed 9-10 hour trip. The going was tough and the weather wasn't terrible, but not the best either. The winds were very chilly and I could feel the parts of my face that weren't covered beginning to freeze.

The first few hours involved traversing over snow slopes of only up to about 30°. As the technicality increased, the weather progressively got worse. After about 3 or 4 hours cramponing on relatively easy snow slopes, we reached the first crux. César lead while I belayed him on a steep slope of very loose snow. He eventually tugged on the rope; this was my signal to go. I first had to pull myself up a thin 40°snow slope which widened out at the top. Here, the snow was very loose and the slope was at about a 65°angle, which required careful cramponing. Eventually the slope lead to a very short 80°section. I made a few futile attempts at getting up; the snow was so loose I couldn't get a grip with my crampons and axes. After a lot of shouting from César I realised what I had to do to get to the top. It required pushing the ends of my ice axes into the loose snow and just trusting that I wouldn't slide down the slope. I eventually managed to get over this obstacle and I joined César at the anchor a little bit shaken.

After a few tugs on the rope, Kenneth came up after me. Kenneth struggled for a long time to get past the crux. All the while, the weather was getting a lot worse. Constant flurries of spindrift stung my naked face like tiny needles. The winds continued to pick up and we found ourselves in a blizzard, 5750m high on a precarious snow slope of a moderately technical mountain in the Peruvian Andes. Meanwhile, I had been struggling with nausea from the moment I finished my breakfast that morning. With lots of shouting and failed attempts, Kenneth eventually managed to get past the 80°section. We paused briefly. Kenneth informed us that he was struggling with a bad altitude-induced headache. We continued on in the blizzard as the slope leveled out into something more manageable. About 15 minutes passed before we stopped again. Kenneth's headache was proving too much and he wanted to turn around. For this I was secretly glad, my nausea was getting to the point of becoming unbearable and the blizzard kept going. César swiftly built an anchor and belayed us down in sections.

At 6:30am we found ourselves back at the start of the steep snow slope. It was a relief to be on easier snow again and the weather was a lot better about 100m further down. Eerie clouds were starting to form over the top of the mountain, I was secretly glad we weren't summiting. A few hours later we got back to the moraine camp. I immediately tucked myself into my down sleeping bag with all my clothes still on. We slept for a few hours. Thankfully when I woke up my nausea had subsided. I later surmised that a mixture of too much breakfast at high altitude and too little rest had contributed to the nausea. As I looked up to Tocllaraju, I could tell the weather wasn't improving up there and I was glad to be where I was.

After copious hot drinks (with honey of course) we packed up camp and headed back to the refugio to recuperate and relax.

Kenneth on Tocllaraju at around 5700m after returning from the crux.

22/08/18

We walked back to Pashpa to meet the taxi driver and said goodbye to our last proper outing in the Peruvian mountains. The plan for tomorrow should have been to organise mules for the Huayhuash circuit. Kenneth however, didn't seem so keen to do the Huayhuash circuit trek. On the other hand, seeing the Cordillera Huayhuash was one of the main reasons I wanted to travel to the Peruvian Andes. I was quite disappointed in Kenneth since he told me earlier that he would hike the Huayhuash circuit with me. Kenneth didn't offer any other plans. I was forced to try to, yet again, find other people to go with me. That evening, I went around all of the main guiding companies around the Parc Ginebra in Huaraz and the house of the guides where I put my name on the notice boards, leaving a message that I was looking for partners to hike the Huayhuash circuit with me. I was just going to have to wait for someone to call me, hopefully with sufficient time for us to complete the circuit.

23/08/18

In the evening a French ski instructor name Jean called me saying that he wanted to hike the Huayhuash circuit with me. That evening we packed and organised a 5am bus to Pocpa.

24/08/18

We arrived in Pocpa at about midday to beautiful clear skies. The hike to the trailhead was still another 4-5 hours. Thankfully on the way there we managed to hitch a ride on a pickup truck which cut about one and a half hours off of our journey. At about 3pm we reached the trailhead proper at Quartelhuain (4170m). We had a choice to keep hiking to the Cacananpunta pass (4690m) or to stay in Quartelhuain. We decided to continue on to the pass. In hindsight, we probably should have stayed at Quartelhuain. On the way up I started to feel a bit nauseous, I hoped it would pass. After a difficult 500m ascent we arrived at the pass and kept on walking in the direction of Mitucocha

lake. It soon started to get dark and we still needed to find a water source for cooking and drinking. The map we had showed a small stream and a small lake along our path towards lake Mitucocha (4260m). At around sunset we decided to settle on camping adjacent to a few muddy pools. It was difficult, but we managed to collect enough water for food and drinking through filtering. It got cold and dark very quickly. We swiftly set up camp and ate food. I was still feeling nauseous.

(a) Jean and a local cook at Quartelhuain.

(b) Looking into the valley north of Quartelhuain from the trail leading to Cacananpunta pass.

25/08/18

We woke up at about 7am and I had no desire to keep hiking. I was feeling very nauseous and walking seemed extremely laborious. We decided to stop at lake Mitucocha and to spend the night there and see if I got better overnight. I did not get better. When I tried to eat I would vomit it out again. I also had bad diarrhea. I made a plan to hike to the local village of Queropalca the next day where I could hopefully get a lift back to civilisation. Jean found an Australian guy to join for the rest of the circuit.

26/08/18

I wasn't feeling any better the next day so I went along with my plan to try to get to Queropalca. Luckily I met some locals along the way with motorbikes. With my very broken Spanish I persuaded one of them to allow me to ride to Queropalca on the back of his motorbike (for a fee of course). Having to cling on to a small Chinese motorbike with a big, heavy backpack over rough, rocky roads made for an uncomfortable journey. When we reached Queropalca, I managed to get a car ride to the town of Baños. From Baños I managed to get another car ride to La Unión. From La Unión I could get a bus back to Huaraz. I arrived back in Huaraz at about 11pm.

27-28/08/18

I decided to wait out whatever I was suffering from in Huaraz until I got better. After another day it became apparent that I wasn't getting any better so I decided to get on a bus back to Lima on the night of the 28th to see a doctor. In the event that I did get better, there clearly wasn't enough time to travel back to Huaraz and re-attempt the Huayhuash circuit or any other major hiking trail. I tried to convince Kenneth to come with me so that we could go to Machu Picchu after staying in Lima for a bit. I couldn't convince Kenneth to leave Huaraz, however. The hostel was building a

Our camping spot at lake Mitucocha when I was feeling very ill. The majestic mount Jirishanca provides a pleasing backdrop.

small bouldering area and Kenneth seemed more interested in that than traveling with me to Machu Picchu...

29/08/18

After arriving in Lima after an 8 hour bus journey, my symptoms still had not improved and I went to see a doctor at the Anglo-American clinic in Lima after reading good reviews online. The doctor diagnosed me with “Traveler’s diarrhea”, a bowel infection commonly picked up by travelers and he prescribed me some antibiotics. That evening, after taking the antibiotics I started feeling a lot better already. I decided to leave for Cusco the next day so I could visit Machu Picchu.

30-31/08/18

The bus journey to Cusco was 20 hours long, but it was cheaper than a direct flight. On the 31st I checked in to a hostel and organised a bus to the hydroelectric dam that marks the start of the trail to the pueblo (town) of Machu Picchu (NB: There are in fact two Machu Picchu’s; the other being the town adjacent to the ruins of the 15th-century Incan citadel).

01/09/18

I took an early morning bus to the Machu Picchu trail head. This part of the Andes was a lot greener than what I was used to in Huaraz, it made for a nice change of scenery. The hike to the pueblo was only about two hours. I checked in to a hostel and bought bus tickets to Machu Picchu for the following morning.

02/09/18

I awoke at around 4:30am in order to catch one of the first few buses to the ruins. It was incredible how many tourists there were. We were allowed in to the archaeological site at around 8am where I stealthily joined a group of English speaking tourists and their tour guide. Machu Picchu was quite beautiful but nothing compared to what we had experienced in the Cordillera Blanca and there were far too many tourists. I arrived in Cusco late that evening.

(a) The classic Machu Picchu view.

(b) More of Machu Picchu and the green surrounding hills.

Sunlight shines over the hills near Machu Picchu.

03/09/18

I had one more day in Cusco to look around, buy copious amounts of pisco (a traditional Peruvian spirit), relax and organise things before heading back to Lima the following day in order to meet back up with Kenneth and catch the plane back home.

04-05/09/18

After another 20 hour bus ride I arrived in Lima on the 5th of July in time for our flight back home.

6. Equipment List

6.1 Clothing

Item	Number	Who	Notes
Winter Down Jacket	2	Ben and Kenneth	-
Merino Wool Thermal Top	2	Ben and Kenneth	-
Merino Wool Thermal Bottoms	2	Ben and Kenneth	-
Fast drying baselayer top	4	Ben and Kenneth	Two each
Thermal Gloves	2	Ben and Kenneth	-
Woolly Hat	2	Ben and Kenneth	-
Lightweight waterproof jacket	2	Ben and Kenneth	-
Lightweight windbreaker	1	Ben	Kenneth's waterproof acts as windbreaker.
Fleece Midlayer	2	Ben and Kenneth	-
Waterproof overtrousers	2	Ben and Kenneth	-
Goretex waterproof hiking boots	2	Ben and Kenneth	Both of our boots were already well broken in
Hiking Socks	6	Ben and Kenneth	Three pairs each
Hiking Liner Socks	6	Ben and Kenneth	Three pairs each
Thermal, quickdrying underpants	6	Ben and Kenneth	Three pairs each
Sandals	2	Ben and Kenneth	-
Sun hat	2	Ben and Kenneth	-

6.2 First Aid

Item	Number	Notes
Nifedipine	10 pills	Treating HAPE
Dexamethasone	10 pills	Treating HACE
Diphenhydramine	10 pills	Antihistamine for allergies
Paracetamol	10 pills	Mild analgesic for headaches etc.
Ibuprofen	10 pills	Mild analgesic for headaches and swelling
Acetazolamide	1 pack	Aiding acclimatisation and treating AMS
Promethazine	10 pills	Treating altitude induces nausea
Codeine	1 sheet	Strong opioid analgesic for intense pain
Calico Triangular Bandages	4	These can be used to tie on splints, make slings and absorb blood as extra bandages
Traumafix Dressings	2	For major bleeding
Blizzard EMS blanket	1	Warm survival blanket
iSplint flexible "Sam" type splint	1	For splinting sprained ankles or any other body part
Medium HSE Dressings	3	For small wounds
Finger Bandages	2	Cuts where plasters aren't big enough
Eye Dressing	2	For eye injuries and spare bandage
Assorted fabric plasters	10	Small cuts and wounds
Strip Wound Closures	1	For pulling together the edges of big cuts, controlling bleeding and reducing scarring
5x5cm Non-adherent pad	2	Wound dressing
Relifix Tape Roll	1	Holding Dressings in place
Tweezers with magnifying glass	1	Splinters and stings
Tuff-cut shears	1	Cutting through clothes and other things
Penlight	1	Measuring eye response in head injuries
Large Crepe Bandages	2	Dealing with sprained ankles etc.
Eye Wash Pods	2	Cleaning dirty wounds and removing dirt/rocks from eyes
Resuscitation Face Shield	1	Keeping vomit away whilst resuscitating
Wound wipes	10	Cleaning Wounds
Hydrocolloid blister plaster	8	Blisters
3.5g sachet burn gel	2	Cooking burns
Tincture of benzine	1	Sticking moleskin around blisters
Moleskin sheets	2	Blisters
Safety pins	6	Puncturing blisters and holding bandages in place

6.3 Equipment brought to Peru

Item	Number	Who	Notes
Telescopic hiking poles (pair)	2	Ben and Kenneth	-
Cat 3 Sunglasses	2	Ben and Kenneth	-
Alpenvereinskarte maps	3	Ben and Kenneth	-
Small Compressible Daypack	1	Ben	-
75L Rucksack	2	Ben and Kenneth	-
1.5L Nalgene	2	Ben and Kenneth	-
MSR Windburner duo	1	Ben	-
Sawyer Squeeze water filter	1	Ben	-
MSR Elixir 3 (3 man tent)	1	Kenneth	Split between backpacks
Titanium Spork	2	Ben and Kenneth	-
Petzl Headtorch	2	Ben and Kenneth	-
Swiss Army Knife	2	Ben and Kenneth	-
Emergency Whistle	2	Ben and Kenneth	-
4 Season Winter Down Sleeping Bag	2	Ben and Kenneth	-
Dry bag	2	Ben and Kenneth	For electronics
Rucksack liner	2	Ben and Kenneth	-
Waterproof Rucksack Cover	2	Ben and Kenneth	-
Inflatable Sleep Mat	2	Ben and Kenneth	-
Portable GPS unit (Garmin eTrex30)	1	Ben	-
Iridium 9575 Extreme Satellite Phone	1	Ben	-
AA Batteries	20	Ben and Kenneth	-
Electrolyte tablets	6 small tubes	Ben and Kenneth	-
Personal equipment and hygiene	2	Ben and Kenneth	Passport, money, toothbrush, contact lenses, phone, cables etc.
Water Purification Tablets	100 tablets	Ben and Kenneth	-
20,000mAh battery pack for charging mobile and satellite phones	2	Ben and Kenneth	-

7. Safety Plan

7.1 Medical and Travel Insurance

Travel insurance will be acquired through the BMC at the "Alpine" level which covers trekking above 5000m. The insurance covers (per person):

What	Up to
Cancellation or Curtailment Charges	£5,000
Emergency Medical & Other Expenses	£10,000,000
Search & Rescue Expenses	£100,000
Hospital Inconvenience Benefit	£1,000 (£50 per day)
Personal Liability	£2,000,000
Personal Money & Travel Documents	£750
Baggage & Passport	£2,500
Delayed Departure	£120 (£30 each 12 hour delay)
Trip Cancellation	£5,000
Missed Departure/Missed Connection	£1000
Avalanche/Weather Delay	£500
Hijack and Kidnap	£2,500 (£100 per day)

7.2 Incident Response

Step 1: Initial Response

- Are you safe?
- Think carefully: assess the situation, what you want to achieve, your immediate assets and limitations.
- Can you locate the casualty? If not, then find him (safely).
- Is the casualty conscious and able to move? If so, go to step 2A Otherwise, step 2B.

Step 2A: Mobile Casualty

- You have assessed the situation; formulate a plan and act upon it.
- Discuss the plan with the casualty, but consider the extent of their injuries and factor this into how much they input.
- Send out a distress signal by sounding six sharp blasts with a whistle. Repeat this every minute until you hear six whistle blasts in return from other hikers.
- If you are unable to use a whistle, then send out six flashes every minute using a head torch.
- If you detect a return signal, continue sending out the distress signal so those responding can pinpoint your location.
- If it becomes dark try to use both a head torch and whistle as this will make it easier to pinpoint your location.
- If you receive no response, continue to send out the signal
- Continue to assess the ability to get to your destination. Remember, a tired injured casualty can easily become an immobile or a dead casualty.

Step 2B: Immobile Casualty

- Don't try and be a hero, it requires real manpower to move an injured casualty.
- Stay where you are and apply all your efforts to keep the casualty alive. Sound six sharp blasts with a whistle. Repeat this every minute until you hear six whistle blasts in return from other hikers.
- If you are unable to use a whistle, then send out six flashes every minute using a head torch.
- If you detect a return signal, continue sending out the signal so those responding can pinpoint your location.
- If it becomes dark try to use both a head torch and whistle as this will make it easier to pinpoint your location.
- If casualty in pain, give pain relieving drugs which are being carried in the personal first aid kit.
- Get the casualty out of the wind and wet.
- Apply first and advanced medical aid.
- For a cold and/or wet casualty, if carrying sleeping bags, put casualty in their sleeping bag, then a blizzard bag, then your sleeping bag. Also erect inflatable mattresses. Erect tent if possible.
- Make sure you're also warm enough yourself and eat and drink plenty.
- Continually assess the casualty and document on the chart in the first aid kit; this information will be very important once evacuated.

Step 3: Medical Assistance and Evacuation

- Document the following:
  - Name and satellite phone number
  - Position, latitude and longitude
  - Accident/illness description
  - Clinical description:
    - Conscious level - AVPU
    - Airway
    - Breathing - respiration rate, depth

        - Circulation - bleeding, skin colour, pulse
        - Disability - obvious injuries
    - Treatment given (e.g. splinting)
    - Next course of action
    - Assistance required
    - Additional information (e.g. weather)
- Establish casualty priority:
    - Priority 1A Immediate evacuation, if possible from accident area
    - Priority 1B Immediate evacuation but can transfer from accident area
    - Priority 2 Urgent evacuation
    - Priority 3 Evacuation needed soon
    - Priority 4 Evacuation needed, but not life threatening
    - Priority 5 Evacuation not needed, advice required
- Should evacuation be required, follow the evacuation procedure

Post Incident

- Each team member will write a personal report.
- Document the list of decisions made with approximate times and locations. Use the list to discuss how you felt prior to, during and after the incident.
- Complete Imperial College incident reporting form.
- If required, speak to UK contact to discuss incident.
- Any major incident will involve a full debriefing on return to London.
- Debrief to be led by Expedition Leader.

7.3 Evacuation Procedure

Step 1: Obtain Medical Advice If Required

- If medical advice is required, call UK based emergency contact BMC medical emergency helpline.

Step 2: Call DEPSAM and Casa de Guias

Include:

- Assessment/diagnosis of casualty
- Casualty location
- Whether medical advice (if required) has been obtained
- Your location
- Medical/physical action being taken
- Name and Sat Phone Number
- Contact number of insurance company
- The nature of assistance required

Step 3: Contact Insurance Company

- Call insurance company (BMC)
- State intention to evacuate and brief insurance company on the situation, including:
    - Reason evacuation is necessary

  - Assessment/diagnosis of casualty
  - Whether rescue services have been contacted

Step 4: Contact Imperial College

- Leave message with Imperial College Security, who will contact Dr. Lorraine Craig.
- Include:
  - Casualty location
  - Your location
  - Medical/physical action being taken
- If you have not spoken to insurers, instruct home contact to establish contact with and brief insurers

Step 5: Standby

- Standby and await further instructions
- Avoid unnecessary use of satellite phone to allow emergency services to contact you
- Await help

Step 6: In the event of not being able to contact local rescue services

- Use sat phone emergency button to contact GEOS International Emergency Response Coordination Center
- If sat phone not working, use GPS to send SOS (garmin etrex30 has this functionality)

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- https://www.princeton.edu/~oa/safety/altitude.html More information about Acetazolamide pre-treatment that suggests a 5 day course of pre-treatment. Also information altitude effects.
- https://www.imperial.ac.uk/media/imperial-college/be-inspired/exploration-board/public/ReruValleyProposal2.pdf Reru Valley Proposal 2011
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- https://www.imperial.ac.uk/media/imperial-college/be-inspired/exploration-board/public/Paper-F---Kyrgyzstan-Report.pdf Kyrgyzstan proposal 2016
- https://www.gov.uk/foreign-travel-advice/peru/safety-and-security FCO Peru travel advice
- https://en.climate-data.org/location/28093/ Climate data for Huaraz

Software

- Garmin BaseCamp version 4.6.2, for making GPS tracks
- Google Earth Pro 7.3, screenshots of regions on earth as well as assistance in route planning

Photos

- Frank Kaminski

Appendix A: Risk Assessment

The risk assessment is divided into three categories: Altitude related risks, general outdoor related risks and travel risks.

Risk Factors

The idea behind using risk factors is to provide a combined evaluation of the significance of a risk to expedition members and thus enable them to prioritize preparations and actions when trying to mitigate these. Both 'Likelihood' and 'Seriousness' of the consequences arising from a hazard are expressed on a scale between 0-5; these are than multiplied to give the combined 'Risk Factor' (just called 'Risk' in the tables), indicating the relative importance of addressing each risk.

A note on High Altitudes

In our opinion the most significant risks of hiking in the Peruvian Andes come with the altitude. AMS can be fatal if proper precautions are not taken. Furthermore, High Altitude Cerebral and Pulmonary Edemas (HACE & HAPE) can occur at altitudes as low as 3000m and are both extremely dangerous, often fatal. AMS, HAPE and HACE are entirely preventable with adequate acclimatisation. However, there is no hard and fast rule as to how long it takes to acclimatise to increases in altitudes, as individuals are affected differently irrespective of physical fitness. We will actively acclimatised in Huaraz for 3 days before venturing into the Cordilleras. Once on the trails we never slept more than 300-500m higher than our previous campsite. During the first few days of a long trek we rarely walked for more than 3-5 hours. After about 2 days in the wilderness we will aimed to walk about 6-7 hours a day. We allowed time in our schedule to take rest days whenever we needed. Furthermore, we referred to the Lake Louise Self Assessment scorecard (see Appendix A) to help us with AMS diagnostics.

Altitude Related Risks

Hazard	Symptoms	Consequences	Prevention	Response	Likelihood	Seriousness	Risk
Mild Acute Mountain Sickness (AMS)	Headache; dizziness; fatigue; shortness of breath; loss of appetite; nausea; disturbed sleep; general feeling of being unwell.	Mild decrease in levels of concentration and performance. Could develop into severe AMS and/or HAPE and/or HACE.	Don't overexert. Acclimatise for 3 days at around 3000m (Huaraz). Only camp at around 300m-500m higher than previous camp. Take 250mg of acetazolamide daily starting 48h prior to hiking.	Rest at current altitude - no further ascent until symptoms resolve. Consider taking acetazolamide and simple analgesia. If no improvent, descend to where last felt OK and start taking acetazolamide.	2-3	3	6-9
Moderate/Severe AMS	Mild AMS that is not improved with 24hr. rest/analgesia. AMS symptoms of increasing severity.	As above. Normal activity may become more difficult. Member might have to be aided by other. HAPE and HACE more likely.	As above.	Descend to altitude below that where symptoms began. Begin treatment with acetazolamide 250mg twice daily. Consider dexamethasone 4 mg four times daily.	2	4	8
High Altitude Pulmonary Edema (HAPE) - Fluid build up in the lungs	Shortness of breath at rest; 'tightness' in the chest; marked fatigue; a feeling of impending suffocation at night; weakness; a persistent cough bringing up white or pink, watery, or frothy fluid; confusion and irrational behaviour are signs that insufficient oxygen is reaching the brain.	As for Severe AMS plus: cyanosis; impaired cerebral functions; coma; death.	As above.	Immediate descent. Maintain upright position. Dexamethasone 4 mg four times daily. Consider nifedipine 20 mg slow release four times daily. Evacuation to a medical facility for follow-up treatment.	2	5	10

Hazard	Symptoms	Consequences	Prevention	Response	Likelihood	Seriousness	Risk
High Altitude Cerebral Edema (HACE) - increased pressures on brain due to swelling tissue as a result of fluid leakage inside the skull	Symptoms can include headache; loss of coordination (ataxia); weakness, and decreasing levels of consciousness inc. disorientation; loss of memory, hallucinations, aggressive behaviour, and coma.	As for Severe AMS plus: Impaired Cerebral functions; Coma; Death.	As above.	Immediate descent; dexamethasone 4 mg four times daily; consider nifedipine 20 mg slow release four times daily. Evacuation to a medical facility for follow-up treatment.	2	5	10
Periodic breathing during sleep	Periodic breathing during sleep, in the absence of cranial trauma, is normal at high altitude.				4	1	4

Outdoor Related

Hazard	Consequences	Preventative Measures	Likelihood	Seriousness	Risk
Disorientation and loss of direction	Possible exposure.	Frequent reference to compass and GPS units. Ensure navigation is shared amongst group. Navigational skills will be refreshed and improved prior to departure.	2	2	4
Exhaustion, fatigue, dizziness	Lowered core body temperature. Irritable and irrational behaviour. Possible stumbling or falling.	Frequent and adequate rests. Party moves at the slowest person's pace. Overcompensate on food and fuel supplies. Take lightweight and high energy food products to ensure weight is minimized and calorific value is maximized.	2	3	6
Dehydration	Headaches, dizziness, stumbling.	Regularly and frequently take in liquid. Drink at least 3-4 litres of fluid per day.	2	3	6
Sun/wind burn and blindnes	Sores, scars, blisters, open wounds, blindness.	Wear sun cream, sunglasses, and sunhat. Keep applying sun cream every few hours	2	2	4
Hypothermia and exposure	Erratic and irrational behaviour, uncontrollable shivering, pale and blue extremities, lowered core body temperature, possible death.	Wear sufficient warm, waterproof and windproof clothing. Always carry spare clothing, and change out of any wet clothing. Do not stay exposed to the wind, and insulate any affected persons. Suitable clothing will be carried to ensure all team members will be sufficiently warm in the harshest of conditions.	2	3	6
Bad Weather	Difficult navigation. The team may become tent-bound.	Refer to compass and GPS units frequently. Share navigation between the group and plan for contingency days. Take plenty of GPS batteries and carry emergency communication equipment.	3	2	6

Hazard	Consequences	Preventative Measures	Likelihood	Seriousness	Risk
Unable to adapt to high altitude physical demands	Impact on hiking schedule.	Undertake physical training to ensure all members are physically capable to endure the expedition (using training schedule developed by the team). Preparedness to adjust altitude gain schedule and descend if necessary before going higher. Undertake suitable acclimatization schedule.	2	3	6
Tripping over guy lines/equipment/rocks	Sprained, twisted, fractured or broken ankle or knee. Other injuries.	Never venture out alone. Be observant.	3	2	6
Small accidents (e.g. cuts, sprains)	Inability to use affected part of body.	Exercise caution at all times, all members will be proficient with the equipment and the techniques used and in first aid techniques.	2	2	4
Larger injuries (e.g. severe bleeding, fractures)	Possibly serious and permanent injury if no medical assistance sought.	Never 'work' alone, exercise caution at all times, all members will be proficient with the equipment and the techniques used and in first aid techniques.	2	4	8
Injury sustained by lifting heavy packs	Strain and or muscular damage. Inability to complete daily tasks and load carrying.	Distribute loads between the group based on abilities of each member. Have rucksack properly fitted beforehand.	2	3	6
Stove breakage	Inability to cook.	Take maintenance and repair kit for stove, including spare parts. All equipment will be checked to make sure everything is operational and in good working order, prior to expedition. Carry food which doesn't require cooking.	2	3	6
Fuel loss / leakage	Unable to cook. Potential fire or explosion causing serious injury.	Visual and frequent checks of stoves and fuel bottles. Only use appropriate fuel containers.	1	3	3
Tent loss / breakage	Breakage: Repair.	Try to get help from other people if possible. Use blizzard bag. Appropriate spares and repair kits to be carried. Tents will be checked long before departure.	1	4	4

Travel

Hazard	Consequences	Preventative Measures	Likelihood	Seriousness	Risk
Car Crash	Serious injury or death, loss of equipment.	Use recommended bus companies such as Cruz del Sur, remain alert during journey, don't get buses at night.	2	5	10
Theft/Mugging	Loss of property, personal injury.	Travel in towns according to FCO advice and use common sense. Remain in a group at all times.	3	1	3
Road Crossings	Injury or death.	Take extra precaution whilst crossing the roads.	1	4	4
Kidnap or hijack	Injury, death, psychological trauma.		1	3	3

Appendix B: Lake Louise Self Assessment Scorecard

The Lake Louise Self Assessment Scorecard was established as a method of quantifying altitude sickness. Due to its compact format it has been used by mountaineers for the assessment of AMS.

Headache	No Headache: 0
	Mild Headache: 1
	Moderate headache: 2
	Severe headache, incapacitating: 3
Gastrointestinal Symptoms	No symptoms: 0
	Poor appetite or nausea: 1
	Moderate nausea or vomiting: 2
	Severe nausea and vomiting, incapacitating: 3
Fatigue and weakness	Not tired or weak: 0
	Mild fatigue/weakness: 1
	Moderate fatigue/weakness: 2
	Severe fatigue/weakness, incapacitating: 3
Dizziness and light-headedness	Not dizzy: 0
	Mild dizziness: 1
	Moderate dizziness: 2
	Severe dizziness, incapacitating: 3
Difficulty sleeping	Slept as well as usual: 0
	Did not sleep as well as usual: 1
	Woke many times, poor night's sleep: 2
	Could not sleep at all: 3

Total Score: /15

Results:

Mild AMS A headache AND a total score of **3+** OR presence of 1+ other symptom(s).
Severe AMS A headache AND a total score of **6+** OR presence of 1+ other symptom(s).

Appendix C: Expenditure

Equipment

Item	Number	Total Cost Predicted	Total Cost Actual
Telescopic hiking poles	2	£100	£100
4 Season down sleeping bag	2	£900	£700
75L Backpack (Osprey Xenith)	2	£400	£402.72
MSR Stove	1	£30	£136
Subtotal		£1430	£1338.72

Travel

Item	Number	Total Cost Predicted	Total Cost Actual
Return Flights to Lima	2	£1500	£1642.52
Bus from Lima to Huaraz	4	£80	£83.2
Buses and taxis to and from the trailheads	lots	£50	£100+
Taxis in Lima	2	£30	£30
Subtotal		£1660	£1855.72

Subsistence

Item	Number	Total Cost Predicted	Total Cost Actual
Freeze dried foods	52	£312	£357.96
Food to buy in Huaraz	lots	£150	£200+
Stove Fuel	3	£21	£21
Subtotal		£425	£578.96

Accommodation

Item	Number	Total Cost Predicted	Total Cost Actual
Hostel in Lima	2	£50	£0
Hostel in Huaraz	lots	£80	£150+
Subtotal		£130	£150

Clothing

Item	Number	Total Cost Predicted	Total Cost Actual
Hiking Trousers	1	£70	£77.80
Breathable gloves	1	£15	£0
Sandals	1	£25	£25
Fleece top	1	£20	£40
GoreTex trousers	1	£0	£100
GoreTex jacket	1	£0	£350
Sun hat	1	£0	£15
Subtotal		£130	£592.80

Other Costs

Item	Number	Total Cost Predicted	Total Cost Actual
NPH fee	2	£52	£50
Airtime credit for Iridium Sat Phone	1	£150	£221
AA Disposable Batteries	20	£25	£25
50 Water Purification Tablets	2	£6.50	£16.80
Water filter	1	£30	£52.90
BMC Insurance and Membership	2	£487.74	£569.46
Alpenvereinskarte maps	3	£33.69	£39.48
Inoculations	6 (2xRabies, 1xviatim each)	£50	£428
First Aid Training	2	£200	£360
Miscellaneous first aid supplies	1	£60	£150+ (drugs were expensive)
Subtotal		£1094.93	£1912.64

Grand Total Expected: £4869.93

Grand Total Actual[1]**:** £6428.84

Difference: -£1558.92

[1]This is without the cost of hiring a mountaineering guide since we didn't originally apply to do this.